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CRUDE STEEL SCARCE

AND CAPACITY OF MANY MILLS MAY BE CURTAILED.

Pig Iron Conditions Sound.—Great Production of Ore for 1906 Predicted.—Advances in Finished Steel Products Not Probable.

In ordinary times the present dullness of the pig iron market, which has become more pronounced during the past week, would be considered an indication of weakness and of approaching decline in prices; but these are not ordinary times, for the production of pig iron is at an unprecedented rate, sales are ahead of production by several months and there is abundant evidence that many buyers have not covered for all their requirements. Requests for delay of shipments of pig iron on contracts, which are common at this period of the year among foundry buyers, are now almost unheard of; while many foundries are urging shipments in advance of the stipulated time for delivery. The cessation in buying came at a fortunate time to check what promised to be a runaway market, and the situation is now thoroughly sound. In the Chicago district there is a prospect of a shortage of pig iron.

The iron ore situation continues to be of absorbing interest. While there are various estimates for the probable production of ore for next year's delivery, men of long experience in the trade do not hesitate to predict that if present prosperous conditions continue, shipments next year will amount to 38,000,000 tons. It is expected that the Steel Corporation will ship 20,000,000 tons in 1906, and several large steel companies will require 1,000,000 tons each. It is estimated that dock facilities at lower lake ports will be capable of handling 40,000,000 tons next year, but it is doubtful whether the railroads will have cars and trackage sufficient to care for such a tremendous tonnage. Owing to the large number of contracts for new vessels, there will be no difficulty in transporting the additional tonnage by lake.

Certain independent interests, especially those which have purchased crude steel on contracts at lower prices than those now prevailing, are urging higher prices of finished products, but the United States Steel Corporation is understood to be strongly opposed to advances, and there is at present no probability of a general change on steel bars, structural steel, pipe and plates; although premiums will occasionally be paid for prompt shipments. The market for structural material in the east has shown increased activity. It is expected that contracts for railroad construction still to be placed this year will amount to 100,000 tons. The contract for 25,000 tons of material for the Pennsylvania Terminal in New York has been placed. Specifications for structural steel from western sources are very heavy, as the favorable weather has made it possible to continue building operations. The rail mill at Chicago has oversold its capacity for 1906, but has filled its contracts for this year and is now rolling on orders for 1906 shipment.

Noteworthy sales of pig iron have been few. The prices continue firm. At Pittsburg from 15,000 to 20,000 tons of foundry was sold on a basis of $18.00 for No. 2 for the second, third and fourth quarters of the year. Bessemer is firm at $17.50 at furnace, and some sales have been made at $17.75. While some southern iron can be bought for $14.00, Birmingham, for No. 2, the usual selling price is $14.50 and in some cases more is asked. In the east sales were confined to small tonnages.

The scarcity of crude steel continues to be an important feature. In Chicago only one mill is offering billets for sale and they are for forging purposes at $35.00 per ton. There is danger of mill operations being seriously embarrassed. Construction work on open-hearth furnaces at South Chicago is being hurried to meet the urgent demand.

Very few sales of sheets are being made. Many consumers purchased heavily before the present schedule went into effect, and the outlook is that there will be much reselling next year. The demand for plates is not as strong as it was a few weeks ago.

Open weather is very favorable for the shipment of coke, and prices are somewhat softer. We note one contract for 50,000 tons of furnace coke for delivery for the whole of next year at $2.50. The ordinary quotation, however, on highest grades of furnace coke is from $2.85 to $3.00.

THE WEEK IN IRON CENTERS.

PITTSBURG.

Pig Iron Dull.—Scarcity of Crude Steel Pronounced.—Coke Prices Easier.

OFFICE OF *The Iron Trade Review*,
521 PARK BUILDING, December 13

There has been nothing during the past week to disturb the tranquillity of the local situation and dull would be a better expression than tranquil to describe conditions which have prevailed. There have been two or three inquiries for pig iron, some of them for good round tonnages, but the only sale reported as closed was for between 15,000 and 20,000 tons of foundry iron at a price equal to $18 valley on No. 2 grade, delivery last nine months of next year. The market is strong at $17.50 valley for Bessemer, but there is comparatively little to be had for first quarter delivery and from reliable sources it is reported that 60,000 tons would clean up everything in sight for that period.

The story to the effect that the Carnegie Steel Co., had decided to erect another merchant mill at Clairton is unfounded, this idea having been abandoned some time ago and the newest structural mill at that plant having just started on its first run of merchantable steel last week. Several other extensive additions at other corporation plants are planned, however, the appropriation having been asked for, but the financial committee and board not having reached a decision as to just what the improvements and additions are to be, they will not be announced.

The scarcity of billets, sheet and tin bars has been felt to a considerable extent and the high price of iron bars has caused an appreciable increase in the consumption of steel where it can be used. The American Sheet & Tin Plate Company, announced this week that 95 percent of its sheet mills and 80 percent of its tin mills are in operation. The Republic Iron & Steel Co., has definitely decided to move its headquarters from Chicago to Pittsburg and it is understood has an option on three floors of the Frick building annex and will take possession April 1.

Pig Iron.—While the market has been comparatively quiet there has been a considerable inquiry from two or three sources and between 15,000 and 20,000 tons of foundry iron for second, third and fourth quarter delivery was sold on contracts on a base of $18 valley furnaces. Several inquiries are for large tonnage but deals have not been closed. There is very little first quarter iron to be had and it is reported that 60,000 tons for that delivery would clean up every bit available. Some Bessemer pig iron, but only a small amount, sold this week at $17.75, furnace, but the market is strong and steady at $17.50. Basic, which has been running along with Bessemer is not as strong as the latter and $17.25 could probably be done on desirable lots. The Steel Corporation as far as can be learned has not yet bought its pig iron for which it has been negotiating for the first quarter, and the delay has been caused by inability to agree upon price which would suit the corporation. We quote:

Bessemer, Valley	$17.50
Bessemer, Pittsburg	18.35
No. 1 Foundry, Pittsburg	18.60 to 18.95
No. 2 Foundry, Pittsburg	18.10 to 18.35
Gray Forge, Pittsburg	17.10 to 17.60
Basic, Valley	17.25 to 17.50
Basic, Pittsburg	18.10 to 18.35

Ferro-Manganese.—Although consumers of ferro-manganese are insistent in their demands they are unable to get any for prompt shipment on new contracts. Dealers are not quoting any price as it is impossible to get the material and quotations are not being made for shipment much before June 1 next year. While $125 has been given as the market for prompt ferro-manganese this price is only nominal, and steel makers who are short have offered much more but could not get the much desired article.

Structural Material.—While new orders are not being booked to the extent they were coming in a month ago, the mills are in no better shape than they have been for several months and have had no opportunity to catch up on their delivery, which is several months behind and no prospects of early improvement. As reported last week, mills have been handicapped to a certain extent by the scarcity of open-hearth material and the tonnage turned out is not the capacity of the mills on this account. We quote unchanged, as follows:

Beams and channels, 15 in. and under, 1.70c; over 15 in., 1.80c; zees, 1.70c, 1.75c; angles, from 3 to 8 in., inclusive, 1.70c; universal and sheared plate, 6¼ in. and wider, 1.60c, base.

Plates.—The anticipated advance of $2 a ton on plates has not yet been announced, although it is expected before the end of the month. The let up on new business being placed has to some degree given the mills a chance to feel a little easier, but in this market, as in regular structural material, the scarcity of open-hearth material has been felt. We quote as follows:

Tank plate, ¼ in. thick, 6¼ in. to 100 in., 1.60c, f. o. b. mill, Pittsburg. Extras are as follows per 100 lb.: Flange and boiler steel, 10c; marine, A. B. M. A. and ordinary fire box, 20c; still bottom, 30c; locomotive fire box, 50c; plates over 100 in. up to 110 in. in width, not less than 5c extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., not less than 15c extra; plates 120 in. to 125 in. wide, not less than 25c extra; plates 125 in. to 130 in., not less than 50c extra; plates 130 in. wide, not less than $1 extra; plates 3-16 in. thick, 10c extra; gauges 7 and 8, 15c extra; No. 9, 25c extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except Pacific Coast.

Rails and Track Material.—There has been but little, if any diminution in orders for rails and the demand for light rails continues as strong as ever. We quote:

Fifty pounds and heavier, 500 ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; light rails, 16-lb. $29; 20-lb. $27.50 to $28; 25 to 45-lb., $27; angle bars for standard sections, 1.50c; spikes, $2.

Sheets.—While no definite announcement has been made to the effect that a still further advance is to be made there is a feeling that it will come before the first of the year. The buying has been of fair volume at the recent advance. The scarcity of steel has been felt for some extent and reports have been current that a few mills have experienced some difficulty in securing enough to meet their demands. The leading interest announces it has 95 percent of its sheet mills and 80 percent of its tin plate capacity in operation. We continue to quote:

American Bessemer steel sheets, box annealed, cold rolled, one pass: Nos. 11-12, 1.90c; Nos. 13-14, 1.95c; Nos. 15-16, 2c; Nos. 17-21, 2.05c; Nos. 22-24, 2.10c; Nos. 25-26, 2.15c; No. 27, 2.20c; No. 28, 2.30c. Galvanized Nos. 10-11, 2.25c; Nos. 12-14, 2.35c; Nos. 15-16, 2.45c; Nos. 17-21, 2.60c; Nos. 22-24, 2.75c; Nos. 25-26, 2.95c; No. 27, 3.15c; No. 28, 3.35c. Corrugated roofings, 1.70c per square for No. 28, painted, 2½ in. corrugation; 2.95c per square for No. 28,

galvanized, 2½ in. corrugation. Quotations f. o. b. Pittsburg for large lots.

Skelp.—There has been but little action in this market during the past week and we continue to quote as follows: Bessemer grooved, 1.65c to 1.70c; sheared, sizes 17 to 74, ¼ inch and heavier, 1.60c; open hearth grooved, 1.70c to 1.75c; iron, grooved, 1.65c to 1.70c; sheared, 1.80c.

Muck Bar.—After the business of the past two weeks when a considerable tonnage was sold the business has been quiet and the market is nominally $31.

Merchant Bars.—Some business has been done on the new price of 2c, Youngstown, 2.05c, Pittsburg, carload lots, but the sales have not been large. Buyers who can use steel have been buying it on account of the high prices being quoted on common iron bars. The eastern market is considerably lower than the Pittsburg market, but as far as can be learned, no eastern bars have been sold into this district. We quote:

Common iron bars, 2c, Youngstown; 2.05c, Pittsburg; hoops 1.85c in carload lots, and 1.95c in less than carload lots, with regular hoop card for extras. Bands, 1.50c; Bessemer steel bars, 1.50c; open-hearth steel bars, 1.50c; plow and cultivator, 1.50c, net; channels, angles, zees and tees under 3 in., 1.60c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 lb., 10c advance; less than 1,000 lb. of a size, 30c advance.

Billets.—Billets have been extremely hard to get and many of the producers are entirely out of the market and making no quotations. Bessemer billets are very strong at $26.50 and higher has been done. Open-hearth billets are quoted from $27 to $28 and sheet bars $27.

Pipes and Tubes.—The demand for merchant pipe is as strong as ever and the leading interests are filled for several months ahead. The high prices on skelp has been a factor which has worked against the interests of some of the independent pipe makers. There has been no change in conditions which have prevailed for several months past. Business has been good with no particular features to attract attention. We continue to quote:

	Steel		Iron	
Consumers' Carloads	Black	Galv.	Black	Galv.
⅛ and¼ inch	71	55	68½	52½
⅜ and ½ inch	75	63	72½	60½
¾ to 6 inches	79	69	77	67
7 to 12 inches	74	59	72	56½
EXTRA STRONG PLAIN ENDS.				
⅛ to ¾ inch	64	52	61½	49½
½ to 4 inches	71	59	68½	56½
4½ to 8 inches	67	55	64½	52½
Double extra strong plain ends, ½ to 8 inches	60	49	75½	49½

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.

	Steel	Iron
1 to 1⅛ inches	44	41
1¼ to 2¼ inches	56	41
2½ inches	58	46
2¾ to 5 inches	64	53
6 to 13 inches	56	41

Less than carload lots two points less.
2½ inches and smaller, over 18 feet, 10 per cent net extra.
2¾ inches and larger, over 22 feet, 10 percent net extra.

Wire and Wire Nails.—The market has been strong during the week and an advance in prices is expected before the end of the year although as yet no meeting of the interests has been called to consider this question. Jobbers' stocks are reported to be just about normal and there are practically no mill stocks, there being difficulty in some instances in getting prompt delivery. We quote:

Wire nails, jobbers' carload lots, $1.80; retailers' carload lots, $1.85, and less than carloads, $1.95c; painted barb wire, $1.95 for jobbers in carloads; retailers' carloads, $2, and less than carloads, $2.10, with 30c for galvanizing. Annealed smooth fence wire is held at $1.65, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 percent discount for cash in 10 days. Iron and steel cut nails, $1.75 to $1.80.

Merchant Steel.—The mills have been unable to maintain deliveries at the rate orders for new business has been booked and consequently are considerably behind with no immediate prospect of catching up with the business. There has been an advance of $2 per ton on channel tire, both solid and cushion and the leading interests have sent out a new list of extras on tire steel. We quote:

Cold rolled and ground shafting, 50 percent off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 1.70c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.50c to 1.55c; smooth finished machinery steel, 1.70c to 1.75c; toe calk, 2c to 2.05c. The price of planished and machine straightened tire is 1.70c base half extras as below. Iron finished tire up to 1½ in. by ½ in., 1.65c base half extra tire list. Iron finished tire 1½ in. by ½ in. and over to be sold on regular bar basis of 1.50c base, half extras steel card. New extras on steel tire is as follows: 1 in. by ¼ in. and heavier, base; 1½ in. x 3-16 in. and 7-32 in., 20c; 1 in. to 1 7-16 x 3-16 and 7-32 in., 30c; 1 in. to 1 7-16 x ⅛ in., 50c; 7/8 in. x ¼ in., 30c; 7/8 in. x 3-16 and 7-32 in., 50c; 7/8 in. x ⅛ and 5-32 in., 60c; ¾ in. x ¼ in., 30c; ¾ in. x 3-16 and 7-32 in., 80c; ¾ in. x ⅛ and 5-32 in., 1.00c; 5/8 in. x 3-16 in., 1.00c; 5/8 in. x ⅛ and 5-32 in., 1.10c.

For intermediate sizes, the next higher extra to be charged in all cases. Sizes not shown are subject to special arrangement.

Old Material.—There has been but little movement in the scrap market and prices remain practically as they were reported last week. On account of the high prices which dealers are asking and also owing to a quietude which usually prevails before the first of the year when deals are made for the year ahead, there has been but little inquiry. We quote:

Heavy melting stock, $18 to $18.50; old steel rails, long lengths, $18 to $18.50; No. 1 cast scrap, $15 to $15.50; heavy cast scrap borings, $10.75 to $11; bundled sheet scrap, $15.50 to $15.75; No. 1 wrought scrap, $20.50 to $21; low phosphorus scrap, $20 to $21.

Coke.—During the week one deal for 50,000 tons of furnace coke for delivery during the whole of next year was closed on a basis of $2.50 ovens. Strictly Connellsville furnace coke is quoted from $2.90 to $3 for spot delivery. Foundry coke is quoted at $3.75 for prompt delivery and $3.50 for delivery through the first half or whole of next year, although some producers are not quoting as low as these figures. For the week ending Dec. 2 the production from the Connellsville district was 278,079 tons and from the lower Connellsville region 91,282 tons. The week showed a gain of more than 600 ovens in the region's active list.

CHICAGO.

Decided Shortage of Crude Steel Curtails Mill Operations. —Strong Demand for Rails.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BUILDING, Dec. 12.

Developments in the iron and steel market during the week are of a nature to cause considerable apprehension among producers and consumers of these products. Next to the car shortage, which is but slightly improved and may cause no little annoyance and loss with the first blast of wintry weather, is the knowledge that danger of a serious shortage of pig iron and crude steel confronts the country. With the exception of wire rods, all forms of rerolling material are unobtainable in this market, and this supply may be exhausted almost any day. One open-hearth interest is doling out a small tonnage of forging billets, for which it is getting $35 a ton. This is the only

Western maker that has billets of any description for sale. Another large producer of steel products has been forced to curtail its rolling operations in order to meet its contract obligations for various forms of intermediate steel. Specifications and new tonnage for finished material are continually in excess of output, and not until large increases in production are made can any relief be obtained. The demand for rails has been of a phenomenal character and the local mill is greatly oversold for 1906. It is impossible to get deliveries of either structural shapes or steel bars inside of three months without payment of stiff premiums. Stocks of pig iron in foundry and furnace yards are dangerously low, and any disturbance in the present supply would cause a partial suspension of foundry operations. The consumption of tubular goods is heavy and prices are exceedingly strong. Plates and sheets are easier, the latter having weakened $1 a ton in price. Offerings of coke are also freer and prices lower. Bar iron is in strong demand and is firm at 1.85c to 2c.

Pig Iron.—The customary lull at this period of the year is more noticeable than usual. New tonnage has dwindled to very light proportions and there is scarcely enough movement to establish a market. Sellers, however, are not uneasy over the situation. From their standpoint the outlook could not possibly be better. Prices are high and consumption heavy. Stocks are low, both in foundry yards and at furnaces—the latter much lower than is generally thought to be the case. But for the open weather that has prevailed this winter, facilitating the delivery of iron in progress, there would not be the quiet market that now exists. The car shortage is still of alarming proportions, but will be more keenly felt when snow is on the ground. The danger of a pig iron shortage is not in this direction. It lies in the very probable decrease in production at an early date. All the furnaces in operation have been pushed to their utmost limit, and many will have to blow out sooner or later for re-lining or other necessary repairs. With no stocks on hand to speak of, new construction wholly insufficient to fill any unexpected gap by shut-downs and foundries very largely depending on iron in transit for continued operation, a condition for serious consideration may be at hand any day. The melt is heavier in this district than ever before, every cupola running to its fullest capacity. Practically the entire trade has covered for its requirements in the first half of next year, and all are now bending their efforts to get shipments on these contracts. Prices are without change, Southern No. 2 foundry being quoted from $14.50 to $15 Birmingham, and Northern No. 2, at $19.50 to $20. Malleable iron is very scarce and strong. Some furnaces will not put out a quotation, handling each inquiry on its individual merits and quoting accordingly. Our prices are as follows:

Lake Superior charcoal	$20.00 to 20.50
Northern Foundry No. 1	20.00 to 20.50
Northern Foundry No. 2	19.50 to 20.00
Northern Foundry No. 3	19.00 to 19.50
Northern Scotch Foundry	20.00 to 20.50
Ohio Strong Softeners No. 1	20.30 to 20.80
Ohio Strong Softeners No. 2	19.80 to 20.30
Southern Foundry No. 1	18.65 to 19.15
Southern Foundry No. 2	18.15 to 18.65
Southern Foundry No. 3	17.65 to 18.15
Southern Foundry No. 4	17.40 to 17.90
Southern No. 1 Soft	18.65 to 19.15
Southern No. 2 Soft	18.15 to 18.65
Southern Gray Forge	16.65 to 17.15
Southern Mottled	16.40 to 16.65
Southern Silveries (4 percent 6 percent Silicon)	19.15 to 19.40
Jackson Co. Silveries....6%, 20.30; 8%, 21.30; 10%,	22.30
Alabama and Georgia Car Wheel	22.65 to 23.15
Malleable Bessemer	20.00
Basic Iron	18.65 to 18.90

Billets.—There is a scarcity of steel in this market. Only one mill is offering billets for sale, and these are of the forging variety, for which $35 a ton Chicago is asked, for all sizes up to and including 10 x 10. The Illinois Co.'s output of steel is wholly insufficient for its wants, and its rolling operations have been curtailed as a result. Construction work on the seven open hearth furnaces building at this company's plant at South Chicago is being rushed with all possible speed that the stringency may be relieved. Wire rods are equally as scarce as billets and a famine is predicted in them at an early date. These are quoted at $33 Pittsburg, and $35 for chain rods.

Bars.—In tonnage and number of orders, the market has eased off somewhat. It is a seasonable dullness however and does not cause any alarm. Prices of both iron and steel bars remain firm as a rock, the market having lost none of its inherent strength. If anything, the tendency towards an advance is stronger. Premiums as high as $5 a ton are paid for quick shipment of steel bars, these being extremely scarce in this market. All the mills are heavily oversold and literally overwhelmed with specifications. Jobbers have great difficulty in replenishing their stocks and frequently find it necessary to adopt unusual methods to keep their customers' wants supplied. Bar iron compares favorably in strength and demand with its sister product. The stiffness of the scrap market would prevent any backward development even if there was not the demand that exists for it. But present conditions are the outcome of the extraordinary consumption of this product. Western mills adhere firmly to their quotations, which range from 1.85c to 2c, Chicago, according to the desire or need for more tonnage. Steel bars are without change in official price. We quote carload lots, mill shipments, Chicago delivery, as follows: Soft steel bars and bands, 1.66½c, half extras; soft steel angles less than 3 x 3, 1.76½c; hoops, 1.91½c, base, full extras; hard steel angles, 1.70 to 1.80c. Jobbers' prices are very firm as follows: Bar iron, 2c to 2.10c full extras; soft steel rounds and squares, 2 in. and larger, $2 per 100 lb. base; flats, 2 in. and 4 in. x 1⅛ in. and thicker, $2 per 100 lb. base; flats, 4½ in. x 5 in. and 6 in. x 5-16 in. and thicker, $2 per 100 lb. base; all ovals, half ovals and half rounds, $2 per 100 lb. base. Other sizes not mentioned above, $1.85 per 100 lb. base, plus half extras.

Sheets.—No trading is being done in either black or galvanized sheets. The market is absolutely lifeless. Practically every consumer in this territory covered for his requirements in the first half of 1906 before the recent advance went into effect. That many speculated on the low prices then prevailing by contracting for more than their usual consumption, becomes increasingly evident each week; and if the market warrants it, there will be considerable reselling next year. As a result of the apathy now prevailing, prices have weakened. Black sheets can be bought on the basis of 2.25c Pittsburg for No. 28 gauge, or 2.41½c Chicago, and galvanized at 3.30c Pittsburg for No. 28 gauge, or 3.46½c Chicago. This is $1 a ton less on both products than the advance of two weeks ago. The cause for this setback is generally attributed to the reported continuance of the rebate system by a large producer. Our prices on carload lots, mill shipments, Chicago delivery, which are without change, are as follows:

Blue annealed, Nos. 9 and 10, 1.76½ to 1.81½c; Nos. 11-12, 1.81½c to 1.86½c; Nos. 13-14, 1.86½ to 1.91½c; Nos. 15 and 16, 1.96½c to 2.01½c. Box annealed, Nos. 18 and 20, 2.16½c; Nos. 22 and 24, 2.21½c to 2.26½ c; Nos. 25 and 26, 2.26½c to 2.31½c; No. 27, 2.31½c to 2.36½c; No. 28, 2.41½c to 2.46½c; No. 29, 2.55½c to 2.61½c. Demand from jobbers' stocks is good and prices are firm. We quote store prices as follows: No. 10, 2c to 2.10c; No. 12, 2.05c to 2.15c; No. 14, 2.10c to 2.20c; No. 16, 2.20c to 2.30c; Nos. 18 and 20, 2.40c to 2.50c; Nos. 22 and 24, 2.45c to 2.55c; No. 26, 2.50c to 2.60c; No. 27, 2.55c to 2.65c; No. 28, 2.65c to

2.70c; No. 30, 3.15c to 3.35c.

Quotations on galvanized sheets, mill shipments, carload lots, Chicago delivery, are as follows: Nos. 10 and 11, 2.36½c to 2.41½c; Nos. 12 and 14, 2.46½c to 2.51½c; Nos. 15 and 16, 2.56½c to 2.61½c; Nos. 17 and 21, 2.71½c to 2.76½c; Nos. 22 and 24, 2.86½c to 2.91½c; No. 26, 3.06½c to 3.11½c; No. 27, 3.26½c to 3.31½c; No. 28, 3.46½c to 3.51½c. From store, galvanized sheets are quoted as follows: Nos. 10, 12 and 14, 3c to 3.10c; Nos. 16, 18 and 20, 2.90c to 3c; Nos. 22 and 24, 3.05c to 3.15c; No. 26, 3.25c to 3.35c; No. 27, 3.45c to 3.55c; No. 28, 3.65c to 3.75c.

Plates.—Neither new tonnage nor specifications are as heavy as they were a few weeks ago. The slump is regarded as temporary, however, and the market is expected to pick up again after the first of the year. Considerable business is looked for from shipbuilding interests in 1906, the recent storm on the great lakes having provided the need for many new and stronger boats. Prices are firm and without change. We quote carload lots, mill shipments, Chicago delivery, as follows: Tank steel, ¼ in. and heavier, up to 100 in. wide 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base; all full extras. Plates, 3-16 in. thick, $2 extra; gauges, 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Local jobbers report a stiff demand from stock and prices are very firm. We quote tank steel, ¼ in. and heavier, up to 72 in. wide, 2c to 2.10c; 72 in. to 96 in. wide, 2.10c to 2.20c; 3-16 in. up to and including 60 in. wide, 2.10c to 2.20c; 3-16 in. 72 in. wide, 2.35c to 2.45c; No. 8, up to 60 in. wide, 2.25c; flange steel 25c extra; heads, 25c extra.

Structural Steel.—Demand for material continues greatly in excess of the country's capacity. Specifications from western sources are especially heavy, due to the continuance of building operations and other improvements as a result of the open weather. A large amount of new tonnage is also under consideration, but it is evident that much of it will be held up because of the inability to get satisfactory deliveries. Local warehouse stocks are low, and jobbers are paying high prices for whatever material they can pick up in any part of the country. Almost any reasonable premium is paid if prompt delivery can only be given. Official prices are without change, mill shipments, Chicago delivery, being as follows: Beams and channels, 3 to 15 in., inclusive, 1.86½c; angles, 3 to 6 in., 1.86½c; angles, larger than 6 in., on one or both legs, 1.96½c; beams, larger than 15 in., 1.96½c; zees, 3 in. and over, 1.86½c; tees, 3 in. and over, 1.91½c, with the usual extras for cutting to exact lengths, punching, coping, bending, or other shop work. Quotations on lots from store are as follows: all angles, 3 in. and larger, $2.25 per 100 lb. base; tees, 3 in. and larger, $2.30 per 100 lb. base; 3, 5, 9, 12 and 15 in. beams, $2.25 per 100 lb. base; 4, 8 and 10 in. beams, $2.50 per 100 lb. base; 6, 7, 18, 20 and 24 in. beams, $2.75 per 100 lb. base; 3, 4, 9, 12 and 15 in. channels, $2.25 per 100 lbs. base; 6, 7, 8 and 10 in. channels, $2.50 per 100 lb. base; 5 in. channels, $2.75 per 100 lb. base.

Rails and Track Supplies.—The tremendous demand for rails is illustrated by the fact that the local mill has oversold its capacity for 1906.

Last month, it booked heavy orders, nearly all of which is for western roads. Practically all the contracts for this year's delivery are filled, and for the first time in years no tonnage will be carried over. The company is now rolling on orders placed a short while ago for 1906 shipment, and will continue on these for the balance of the year. Nothing of interest has developed during the week under review. Light rails are holding well at their new prices, demand being of good volume. New tonnage of standard sections is light, though railroads are taking all the material that is shipped them and pressing eagerly for more. Track supplies are moving freely, the demand for spikes and track bolts being especially heavy. Quotations are unchanged as follows: Heavy sections in 500 ton lots, f. o. b. mill, $28; less than 500 tons to car lots, $30; less than carload lots, $32. Light rails f. o. b. Milwaukee mill: 12-lb. sections, $32; 16-lb., $31; 20-lb., $30; 25-lb., $28; 30, 35, 40 and 45-lb. sections, $27.50. Track supplies f. o. b. Joliet are as follows: Angle bars, 1.50c to 1.75c; track bolts, 3¼ x ¾, with square nuts, $2.50 to $2.60 per 100 lbs.; with hexagon nuts, $2.65 to $2.80.

Merchant Steel.—No decrease in the volume of specifications is noted, despite the lessening of activity in other lines. All the mills are running to their fullest capacity, but are still woefully behind with their orders. Few implement plants will shut down this season for inventory taking, and those that have signified their intention of doing so have asked that their shipments continue. All classes of consumers are pressing mills hard for material. Prices are without change. We quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 2.10c; sleigh shoe, flat sizes, 1.71½c; concave and convex, 1.86½c; cutter shoe, 2.35c to 2.40c; smooth finished machinery steel, 1.91½c; smooth finished tire, 1.86½c; plow steel, 2.20c and upward, according to quality; toe calk steel, 2.21c; railway spring, 1.86½c. Cold rolled shafting 50 and 2½ percent off to dealers, 50 percent off in carload lots, and 45 percent in less than carload lots. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and up.

Cast Iron Pipe.—The market is devoid of any interesting feature, this being the dull season of the year for cast iron pipe. New business is limited to routine orders for repair purposes from such districts where the climate permits these to be made. Prices are firm and without change. We quote carload lots, f. o. b. Chicago: 4-in. water pipe, $31; 6, 8, 10 and 12-in., $30; larger sizes, $29.50; gas pipe $1 extra.

Merchant Pipe.—Jobbers report that the demand for pipe is of encouraging volume. The open weather that has prevailed in the West for the greater part of the winter has permitted building operations and outdoor improvements to be continued longer than usual, and this has stimulated the demand for pipe. Prices are firm and without change. We quote carload lots f. o. b. Chicago, ¾ to 6-in. black steel pipe, 78.35 percent discount from list. From stock, jobbers' discounts are 76½ to 77 percent.

Boiler Tubes.—No news of importance has developed during the past week. New tonnage is of good volume and specifications are active. Shipments from mills are unsatisfactory, due to the heavy demand and car scarcity, and local jobbers are having trouble in meeting their obligations. Prices are firm and without change. We quote carload lots, Chicago delivery as follows:

	Steel.	Iron.	Seamless.
1 to 1½ inches	40.35	37.35	55.00
1¾ to 2¼ inches	54.35	39.35	40.00
2½ inches	56.35	44.35	43.00
2¾ to 5 inches	62.35	51.35	
Up to 4½ inches			50.50
6 to 13 inches	52.35	37.35	

Less than carload lots from store, as follows:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches, inclusive	40	35	42½
1¾ to 2¼ inches, inclusive	50	35	35
2½ inches, inclusive	52½	35	30
2¾ to 5 inches, inclusive	60	47½	42½

Wire Products.—There is a brisk demand for all forms of wire products. It is especially heavy for poultry netting and open fencing. Stocks of wire nails among dealers and retailers are low, and the calls for relief are numerous and insistent. Barb and smooth wire are also moving freely. Western manufacturers have been great-

ly handicapped by a scarcity of cars for several weeks past, and although the situation improved somewhat in the last two weeks, it is still a menace to free and uninterrupted delivery. Prices are very strong and uniformly maintained. We quote carload lots to jobbers, mill shipments, Chicago delivery, as follows: Wire nails, $1.95 painted barb wire, $2.10; galvanized barb wire, $2.40; smooth annealed wire, $1.80; smooth galvanized barb wire, $2.10; polished staples, $2.10; galvanized staples, $2.35. Carload lots to retailers, 5 cents higher than above prices; less than carload lots, 15 cents higher are quoted.

Coke.—There is a good demand for spot coke, but on contracts little has been done in the week under review. For immediate shipment, prices for standard 72-hour Connellsville grades range from $3.50 to $3.75 ovens. Wise County fuel is scarce in this market as a result of the car famine in West Virginia, and offerings are light. The output of by-product coke in this district will be greatly increased January 1 by the completion of the 120 ovens that have been under construction at South Chicago. When the additions to the Milwaukee plant are also completed, it is expected that the total production of by-product coke in and near Chicago will be sufficient for the needs of foundrymen in this section. This product is quoted now from $5.15 to $5.25 Chicago.

Old Material.—The market maintains the status quo of a week ago. Demand is neither general nor heavy, buying and selling being confined to interests outside of the large consumers. Prices are strong and there is no disposition to shade them. Several new lists are on the market, including one from the Santa Fe for 3000 tons and smaller ones from I. C., C, R. I. & P.; C. M. & St. P. Dealers are bidding actively for the material offered considering present conditions and prices a good enough basis for speculation on the future. Heavy melting steel continues scarce, and a considerable tonnage is being shipped to eastern points. We quote gross tons as follows:

Old Steel Rails (4 feet and over)	$17.25 to 17.75
Old Steel Rails (less than 4 feet)	16.00 to 16.50
Old Iron Rails	23.00 to 23.50
Relaying Rails, subject to inspection	26.50 to 27.00
Heavy Melting Steel	15.25 to 15.75
Mixed Country Steel	12.50 to 13.00
Old Car Wheels	19.50 to 20.00

For net tons we quote as follows:

No. 1 R. R. Wrought	$18.00 to 18.50
No. 2 R .R. Wrought	17.50 to 18.00
Shafting	18.00 to 18.50
Dealers' Forge No. 1	14.50 to 15.00
Wrought Pipe and Flues	12.50 to 13.00
No. 1 Cast, 150 lbs. and less	14.50 to 15.00
No. 1 Mill	9.50 to 10.00
No. 1 Busheling	12.50 to 13.00
No. 2 Busheling	12.25 to 12.75
Country Sheet	8.50 to 9.00
No. 1 Boilers Cut	12.50 to 13.00
Boiler Punchings	15.00 to 15.50
Iron Car Axles	24.00 to 24.50
Steel Car Axles	20.00 to 21.00
Iron Axle Turnings	11.50 to 12.00
Cast Borings	10.00 to 10.50
Mixed Borings, etc	10.00 to 10.50
Machine Shop Turnings	11.75 to 12.25
Railroad Malleable	15.00 to 15.50
Agricultural Malleable	14.00 to 14.50
Stove Plate and Light Cast Scrap	12.00 to 12.50
Old Iron Splice Bars	20.00 to 20.50

CLEVELAND.

Practically All Ore Sold.—Various Estimates of Production for 1906.—Pig Iron Quiet.

OFFICE OF *The Iron Trade Review*,
BROWNING BUILDING, December 12.

Iron Ore.—Sales of iron ore have continued during the past week at such a rapid rate, that there is very little of any kind, either Bessemer or non-Bessemer, left, with the exception of some very undesirable grades. Estimates of the probable production of ore for next year's delivery vary from 34,000,000 to 38,000,000 tons, and it seems probable that the shipments will be nearer the latter than the former. It is expected that the Steel Corporation will ship next year, 20,000,000 tons. Other large consumers will be the Lackawanna Steel Co., 1,000,000 tons; Cambria Steel Co., 1,000,000; Jones & Laughlin Steel Co., 1,000,000; Republic Iron & Steel Co., 600,000; Pennsylvania Steel Co., 300,000. If these large consumers should require, as expected, about 24,000,000 tons, and the total shipments should be 38,000,000 tons, 14,000,000 tons would be left for the independent merchant furnaces, and that amount would in all probability, not exceed their requirements. There is some difference of opinion as to the amount of ore which could be handled at lower lake ports. It is estimated that the dock facilities next year will be capable of handling 40,000,000 tons, but it is doubtful whether trackage and car supply would be adequate for such a tremendous amount of ore. No fears are expressed that there will be any trouble about the vessels being able to carry all the ore that can be mined, as the new vessels now under contract will be able to take care of the additional tonnage.

Pig Iron.—With the period of holiday dullness and inventory-taking to contend with, buying continues light, though prices are firm and there are no indications of a break. Producers are generally well sold out and consumers almost as well covered for the first quarter, only occasional small sales making up present business. Northern No. 2 foundry is strong at $18, valley, one sale of 1,000 tons being made at this figure during the week. For Southern iron $14.50 is generally asked for No. 2 foundry, and it is probably impossible to secure any heavy tonnage below this figure. Quotations, however, are somewhat irregular, a few scattered furnaces making small offerings as low as $14.00, and certain of the larger producers insisting that $14.50 is the bottom figure. The coke situation has been considerably relieved by improved transportation facilities, and prices for spot coke have eased off slightly, though foundry grades remain near the quotations of last week, $3.50 and $3.75, with the best grades as high as $4.00. Furnace coke has sold during the week under $3.00, and small lots can probably be obtained as low as $2.85. We quote f. o. b., Cleveland, as follows:

Bessemer	$18.35
No. 1 Foundry	18.50 to 19.00
No. 2 Foundry	18.00 to 18.35
No. 3 Foundry	17.50 to 18.00
No. 2 Southern	17.85 to 18.35
Gay Forge	16.85 to 17.35
Gay Forge, Southern	15.85 to 16.35
Lake Superior charcoal	19.00 to 19.50

Finished Material.—Sheets are in better demand than for some time past, and deliveries short of five or six weeks are now impossible to secure, whereas better deliveries have heretofore been obtainable. Prices are gradually adapting themselves in accordance with the recently announced advance, which, as usual, has been slow of establishment, owing to heavy sales just before advances of quotations, making resales possible. Bar iron continues firm at the new quotations; there is no apparent slack in either this line or in plates, though deliveries within a month are possible. Structural materials are as eagerly sought as ever, and specifications on contracts for next season's needs are extremely heavy. The practical stoppage of building operations by unfavorable conditions has very generally done away with requests for immediate shipment.

Old Materials.—The market is strong and trading is reported light, although better than customary for this time of year, inventory-taking especially affecting this this line. Heavy melting steel continues as the leader,

and a considerable tonnage has been sold during the week. Prices are practically unchanged. We quote, f. o. b., Cleveland, as follows:

Old Iron rails	$25.00 to 26.00
Old steel rails (over 6 feet)	16.00 to 17.50
Old steel rails (under 6 feet)	17.00 to 18.00
Old car wheels	17.00 to 17.00
Steel boiler plate	14.00 to 15.00
Steel axles	20.00 to 21.00
Malleable iron (railroad)	16.00 to 17.00
Malleable iron (agricultural)	15.00 to 16.00
Heavy steel	17.00 to 17.50

We quote as follows, net tons:

No. 1 R. R. wrought	17.50 to 18.00
No. 1 busheling	15.00 to 15.50
No. 1 machine cast	13.75 to 14.25
Iron axles	22.50 to 23.50
Axle turnings	11.50 to 12.50
Wrought turnings (free from cast)	11.00 to 12.00
Grate bars	9.00 to 9.50
Pipes and flues	13.00 to 14.00
Tank iron	11.00 to 11.50
Hoop and band iron	8.00 to 9.00
Sheet iron	7.00 to 8.00
Wrought drillings	11.00 to 12.00
Stove plate	10.50 to 11.00
Cast borings	8.50 to 9.50

CINCINNATI.

Usual December Requests to Delay Shipments Are Not Made.—Market Quiet.

Pig Iron.—The market remains quiet and without particular change. There is no general inquiry and whatever buying is being done is the result of direct solicitation of salesmen. Prices remain at $14.00 Birmingham as a minimum for southern iron with a number of the important producers holding at $14.50 Birmingham. Some of the southern furnace interests which have been out of the market in the recent past are again open for business on the basis of $14.50 Birmingham for the first and second quarters of next year although one important producer is open for only second quarter business. In northern irons $17.50 for No. 2 foundry at furnace is minimum with $18.00 the general asking price. As a rule consumers are calling for deliveries on contracts and it is a matter of comment in the trade that the usual requests to hold up shipments which are quite customary during the month of December are not coming in. Many consumers hold up shipments in ordinary times during December on account of Jan. 1 being the period of the year for stock taking and annual statements. This is regarded as evidence of continued consumption and full satisfaction with prices called for in the contracts now being filled.

A resumption of buying is not expected until after the first of the year and the situation is one of furnaces well supplied with orders and consumers just as well covered. On the few inquiries that have been made for prices on second half delivery sales agencies have urged furnace interests to authorize quotations about 50 cents per ton under current values. This the furnaces have declined to do and we hear of no transactions in southern iron for deliveries beyond July of next year. We quote f. o. b. Cincinnati as follows:

Southern Foundry No. 1	$17.25 to 17.75
Southern Foundry No. 2	16.75 to 17.25
Southern Foundry No. 3	16.25 to 16.75
Southern Foundry No. 4	15.75 to 16.25
Southern Foundry No. 1, soft	17.25 to 17.75
Southern Foundry No. 2, soft	16.75 to 17.25
Gray Forge	15.75 to 16.00
Northern Foundry No. 1	19.15 to 19.65
Northern Foundry No. 2	18.65 to 19.15
Northern Foundry No. 3	18.15 to 18.65
Jackson County Silvery, 8 percent	20.15 to 20.65
Southern Charcoal	19.75 to 20.25

Finished Material.—The market continues firm with a good demand and recent advance in bar iron is well maintained. There is some improvement in the inquiry for sheets and plates. Bar iron is quoted at 1.80c; steel bars at 1.63c, half extras with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets No. 10 and No. 12, in car lots are 2.48c. We quote black sheets. No. 27 at 2.30c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.75c; No. 27, 2.65c; No. 16, 2.25c; No. 14, 2.15c; No. 12, 2.05c. Tank plates are firm and sell out of store at 2c for ¼-in. and 2.10c for 3-16, Nos. 8 and 10. Beams and channels are quoted at 2.25c to 2.50c from stock and angles at 2c to 2.05c for base sizes.

In merchant pipe the market is stronger in tone and quotations for wrought iron pipe are only obtainable under submitted specifications as the scarcity of skelp is having an influence on the output. Steel pipe is also firmer as some of the independent mills have advanced their prices. We quote f. o. b. Cincinnati:

MERCHANT PIPE.

(Basing Discounts.)

	Steel Pipe. Black.	Steel Pipe. Galv.	Guaranteed Wrought Iron Pipe. Black.	Guaranteed Wrought Iron Pipe. Galv.
	Percent.	Percent.	Percent.	Percent.
⅛ and ¼ inches	69.7	53.7	67.2	51.2
⅜ and ½ inches	73.7	61.7	71.2	59.2
¾ to 6 inches	77.7	67.7	75.7	65.7
7 to 12 inches	72.7	57.7	70.7	55.2

Coke.—The market is assuming a more normal condition under an improved movement and car supply. Inquiry is less urgent, but there is no change in prices. Quotations in the leading coke producing districts are as follows:

†Wise County, Va. Furnace Coke prompt shipment.	$ 3.00 to 3.25 per ton
Wise County, Va. Foundry Coke prompt shipment.	4.00 per ton
Pocahontas Furnace Coke on contracts	
Pocahontas Foundry Coke on contracts	
Connellsville Furnace Coke prompt shipment	3.00 to 3.25 per ton
Connellsville Foundry Coke prompt shipment	3.90 to 4.25 per ton
New River Foundry Coke on contracts or prompt ship't.	3.75 per ton
New River Furnace Coke, prompt shipment	3.00 per ton

†Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.65 per ton on $9.00 pig iron, plus 17 percent of the advance on pig iron above $9.00 Birmingham.

Old Material.—The market is firm with an advancing tendency. We quote f. o. b. Cincinnati.

Old No. 1 railroad wrought, net tons	$17.50 to 18.00
Cast machine and foundry, net tons	14.00 to 14.50
Old iron rails, gross tons	24.00 to 25.00
Old steel rails, gross tons	16.50 to 17.00
Old short lengths, gross tons	17.50 to 18.00
Old iron axles, net tons	23.50 to 24.00
Stove plate, net tons	10.50 to 11.00
Wrought turnings, net tons	11.00 to 12.00
Cast borings, net tons	9.00 to 9.50
Car wheels, net tons	16.50 to 17.00

PHILADELPHIA.

Little Activity in Pig Iron, While Prices are Firm.—General Conditions Good.

Pig Iron.—There is a holiday atmosphere about the market that is not conducive to great activity. This refers to new orders, of course, for the furnaces continue as busy as they can be. Buyers, however, seem content to await developments, which certainly have not been against them. The continued open winter, which has been of immense value to the transportation interests; the easier tone in the coke market, the fixing of the price of ores, and the knowledge that in a few months a number of new and old furnaces are to go in blast—all these factors help to keep the prices of pig down. Locally there is an additional element in the strike of the molders, which has necessarily diminished the demand from a number of foundries. At the same time there is no weakness in prices, which remain practically unchanged. Spot order for No. 2 X foundry can hardly be filled for less than $18.75, though $18.50 is still the normal price. The following figures may be quoted:

No 1X Foundry	$19.00 to 19.25
No. 2X Foundry	18.50 to 18.75
No. 2 Plain	18.00 to 18.25
Standard Gray Forge	16.50 to 17.00
Basic	17.75 to 18.25
Low Phosphorus	24.00 to 24.50
Southern No. 2X, rail	18.50 to 18.75

Finished Material.—There is less excitement than there has been, but the market in all lines is no less strong. Bar iron continues firm, and the demand for plates and the heavier forms of structural steel is unprecedented. The official prices remain unchanged as follows: Beams, channels and

angles, according to specifications, 1.82½c to 2.50c; refined iron bars, 1.75c to 1.85c; steel bars, 1.63½c to 1.83c; plates, 1.73½c to 1.83½c.

Old Material.—The scrap market reflects the prevailing quietude, and for the first time in some weeks quotations show no changes. There is a steady demand for steel scrap, and the yards report the usual accumulation in preparation for the uncertainties of winter. Prices remain the same as last week as follows:

Old steel rails	$18.25 to 18.50
No. 1 steel scrap	18.00 to 18.50
Old steel axles	21.50 to 22.00
Old iron axles	28.00 to 28.50
Old iron rails	23.00 to 24.00
Old carwheels	17.50 to 18.00
Choice scrap, R. R. No. 1 Wrought	23.00 to 23.50
No. 1 yard scrap	20.00 to 21.00
Machinery scrap	16.50 to 17.00
Low phosphorus scrap	22.00 to 23.00
Wrought iron pipe	16.50 to 17.00
No. 1 forge fire scrap	16.50 to 17.00
No 2 forge fire scrap, ordinary	13.25 to 13.70
Wrought turnings	15.00 to 15.55
Axle turnings, heavy	15.50 to 16.00
Cast borings	10.50 to 11.25
Stove plate	13.25 to 13.75

NEW YORK.

Sales of Pig Iron Comparatively Few.—Heavy Business in Structural Steel.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., December 12.

Pig Iron.—Both consumers and producers seem to have settled down to a quiet month, and every one with the exception of the belated melter who is not covered for current requirements hails the lull with relief. Most buyers are well supplied with material and furnace men are quite satisfied to work along for a while on existing contracts. In the meantime the movement of metal continues as rapidly as transportation facilities permit, and requests to anticipate ordered shipments are common. There is a good steady picking up of metals and stray off lots find a ready sale whenever they come to the surface. Comparatively little was done in basic during the week, the 8,000 tons reported sold to the Eastern Pennsylvania steel mills being material contracted for several days earlier. The bulk of the business concerned foundry iron and gray forge. The total sales probably did not exceed 15,000 or 20,000 tons. A number of small lots were taken by pipe founders and considerable low-grade iron was bought up to take the place of scrap. Outside the usual tonnages bought by pipe works and pump makers there was considerable dealing in small lots, the following being typical both as to quality and quantity: 100 tons of No. 2 New York state; 500 tons of Virginia No. 3; 250 tons Eastern Pennsylvania. The following are prices at tidewater:

Northern No. 1 Foundry	$18.75 to 19.25
No. 2 Foundry	18.00 to 18.75
No. 2 Plain	17.50 to 18.00
No. 1 Southern Foundry	18.75
No. 2 Southern Foundry	18.25
No. 3 Southern Foundry	17.25 to 18.00
No. 4 Foundry	17.00 to 17.25

Pig Iron Certificates.—Trading in pig iron certificates and warrants on the New York Produce Exchange has not been brisk during the week. Prices are a shade lower than those quoted a week ago. No sales of importance are reported. Foundry iron warrants follow:

	Bid.	Asked.
December	16.75	17.25
January	16.75	17.25
February	16.60	17.25
March	16.70	17.25

Finished Iron and Steel.—All lines appear to be experiencing a slight easing off due to the approach of the year's end, except structural steel, which is showing renewed activity. The heavier tonnages of rails have mostly been placed and consumers of plates and other products are apparently fairly well covered, but the demand for shapes continues as urgent as ever. The American Bridge Co. booked orders aggregating more than 20,000 tons during the week mostly on inquiries already mentioned in these columns. A contract for a warehouse in Pittsburg calls for about 2,000 tons and many bids are still outstanding. The year is expected to close with totals surpassing any figures hitherto attained. Of the work still to be placed this year the railroad work alone comprises fully 100,000 tons. The requirement for the Pennsylvania Railroad terminal mentioned last week will be filled by Milliken Bros., Inc. The contract involves about 25,000 tons of material, 22,000 tons of steel being required for the terminal building, proper, and about 2,500 for the so-called "Service" building on the other side of the street. The same firm also secured the contract for the building being erected by the West Street Improvement Co. on West street, New York. About 5,000 tons of steel will be needed to erect the 28 stories of this structure. The McClintic-Marshall Construction Co. will furnish the steel for a sugar refinery to be built for the American Sugar Refining Co. in Louisiana. The contract calls for about 4,000 tons of new steel and an equal quantity of old work. The City & County Construction Co. is considering bids for the first 4,000 tons of bridge material for the new Manchester road, and the Brooklyn Elevated system will require 3,000 tons of steel for an additional mile of elevated structure. The New York terminal of the McAdoo tunnels under the North river will comprise two large buildings requiring some 20,000 tons of steel. Foreign business in the structural field is not as active as the home product, but since the latter is exceptional, no one complains. There is some importing by firms which do an export trade and also some for American consumption. The demand for small lots continues active and premiums are still common.

The following are prices at tidewater: Angles, 3 to 6 in. x ¼ in. and heavier, 1.84½c; beams, 3 to 15 in., 1.84½c; tees, 3 x ¼ in. and heavier, 1.89½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine and ordinary fire box, 1.94½c; refined iron bars, 1.84½c; soft steel bars, 1.64½c to 1.79c; sheets in carload lots New York, black, 2.40c.

Old Materials.—The market has quieted down in anticipation of the usual activity which marks the close of the year. Stock taking will now occupy the attention of consumers, and only immediate requirements awake interest. Prices are very firm throughout the list and holders appear confident that the new year will open with a higher range of quotations. About 900 tons of wrought scrap found purchases this week. The following are prices at tidewater approximately:

Old iron rails	$21.00 to 22.00
Old steel rails, long lengths	15.50 to 16.00
Old steel rails, short pieces	15.00 to 15.50
Relaying rails	23.00 to 24.00
Old car wheels	16.00 to 16.50
Old iron car axles	24.00 to 25.00
Old steel car axles	19.00 to 19.50
Heavy melting steel scrap	15.50 to 16.00
No. 1 railroad wrought scrap	20.00 to 21.00
Iron track scrap	18.50 to 19.50
Wrought pipe	14.00 to 15.00
Cast borings	10.00 to 10.25
Wrought turnings	14.50 to 15.50

The Flagship Released.—The steel steamship W. E. Corey, flagship of the United States Steel Corporation, which struck on the rocks at Gull Island during the recent Lake Superior gale and for several days resisted all efforts for her release, was finally floated early this week and will be docked for repairs. The damage, except to the bottom plates, is not believed to be extensive. Leaks in the ship were first patched with cement and then by the aid of compressors she was raised about four feet and pulled off the jagged rocks by tugs.

OBITUARY.

George M. Ballard, a manufacturer of malleable iron castings of Newark, N. J., died Dec. 4, at the age of 68 years. Mr. Ballard was born in Bloomfield, N. J.

James M. Cooper, recently appointed clerk of the committee on patents of the national House of Representatives, died Dec. 6 at Concord, N. H., of cerebral hemorrhage.

Allen C. Milliken, formerly superintendent of the Pottsville Iron & Steel Co., Pottsville Pa., and later in charge of the Midvale Iron Works for Graff, Bennett & Co., died at Pottsville Dec. 12 at the age of sixty.

George H. Tatnall, at one time manager of the Lockhart Iron & Steel Works, and later manager of the Pressed Steel Car Co.'s works at Allegheny. Pa., died at his home in the latter city Dec. 4, aged 56.

Henry R. Sloat, a director and assistant secretary and treasurer of the Tennessee Coal, Iron & Railway Co., with officers in New York, died at his home in Sloatsburg, N. Y., Dec. 11. He was seventy years old, and was well known in the iron and steel business.

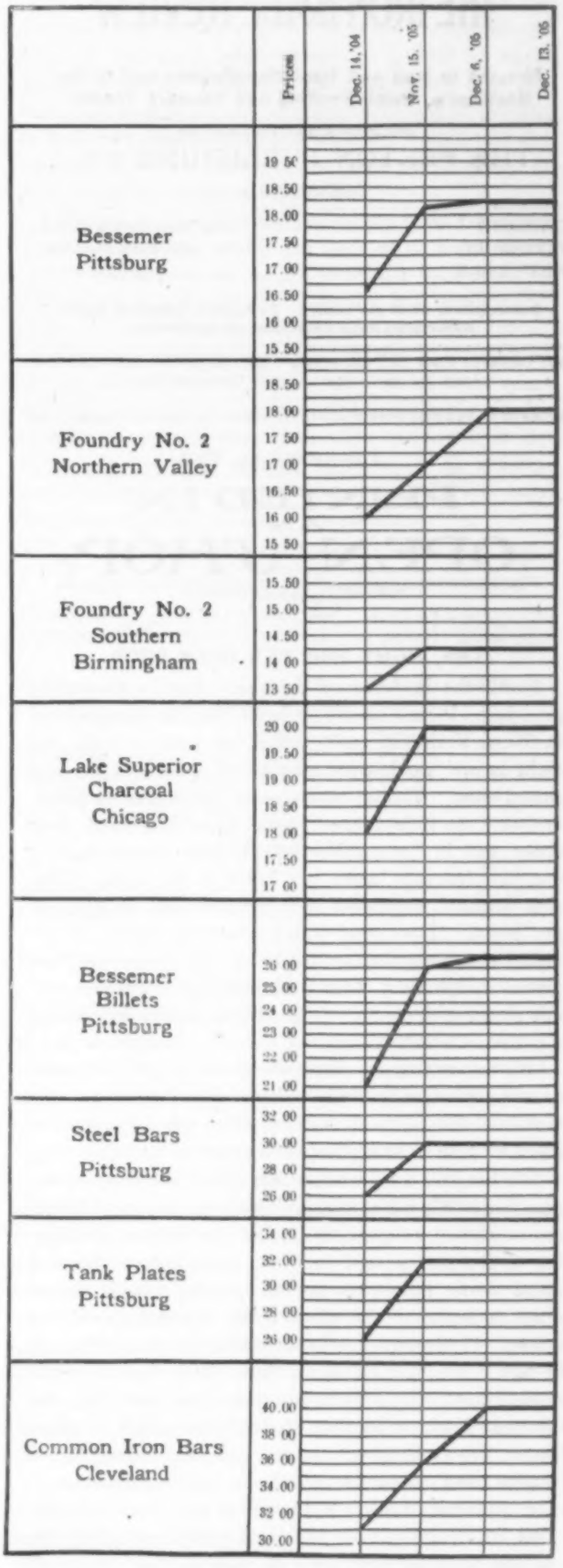
Bernard Fay, for the past eight years an official in the mechanical department of the Union Switch & Signal Works, Swissvale, Pa., died Dec. 6 from heart failure. He was employed for a time at the Westinghouse Airbrake Co.'s plant at Wilmerding. He was 61 years old and served in the Civil war.

George Garvey, superintendent of transportation at the steel mill of the Carnegie Steel Co., died Dec. 5 at a New Castle hospital from injuries sustained by being run down by a dinky engine in the yards Sept. 15. He was a veteran of the Civil war and had spent practically all his life at coal and steel plants.

Peter B. Acker, vice president of the Union Stove Works, New York, died at his summer home in Peekskill, N. Y., Dec. 9, after an illness of two months. He was for many years a resident of East Orange, N. J., and a member of the New England Society of that place. In 1904 he was elected president of the National Association of Stove Manufacturers. The foundries of the Union Stove Works are located in Peekskill.

Capt. Samuel S. Brown, one of the most prominent business men and manufacturers of Pittsburg, died at his home, Brown's Station, near Pittsburg, Monday morning, Dec. 11. He was president and sole owner of the Brown Hoisting Machinery Co., with offices in the Frick Building, Pittsburg, a director in several of the big banks, president of the Pittsburg Coal exchange, president of the Arkansas River Packet Co., of Memphis, a large owner in the Monongahela River Packet Co., a director in the Consolidated Ice Co., and president and principal owner in the Homestead & Pittsburg Bridge Co., and a director in the Monongahela River Consolidated Coal & Coke Co. Capt. Brown was born in Minersville, now the Thirteenth ward, Pittsburg, Sept. 13, 1842. His father was heavily interested in steamboat property on the rivers, and during the civil war furnished coal to the government at Pittsburg, Cairo, Pittsburg Landing, Paducah, and Memphis for the river gunboats. Samuel S. Brown spent much of the time during the war on his father's boats, and was present at the siege of Vicksburg. He was an enthusiastic turfman, was president of the Kentucky Racing Association at Lexington, Ky., and a large stockholder in the Saratoga Racing Association, and a member of the American Turf Association. Capt. Brown had been in ill health about a year, but had been confined to his home but about two months. The funeral was held Wednesday afternoon. Capt. Brown left an immense estate.

PRICE CHART.



THE IRON TRADE REVIEW

Devoted to Iron and Steel Manufacture and to the Machinery, Metal-Working and Foundry Trades.

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ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

DECEMBER 14, 1905

PRINTED IN AN OPEN SHOP

THE FIGHT FOR THE OPEN SHOP.

Sentiment in favor of the open shop is constantly growing. It now seems probable that the compositors in New York city will strike on Jan. 1, 1906 for eight hours' work with nine hours' pay, and for the closed shop. Within seven years the wages of printers in "machine offices" have been increased four times and in "non-union offices" five times, raising the pay from 30 cents per hour to 39 cents. This new demand, if granted, will raise the pay to 44 cents per hour. If we may judge from the action of the Hill Publishing Co., publisher of the *American Machinist* and *Power*, New York employers will not submit to these demands. The Hill Company has issued a notice in which it says:

We believe that the closed shop with all its restrictions is doing more to injure all American industries and the men employed in them, than any other thing. We are opposed to it on principle and shall resist it.

We heartily congratulate the Hill Company on the position which it has taken. Since the strike of printers employed on publications of the Penton Publishing Co. was declared on Oct. 30, we have become more firmly than ever of the opinion that it is our duty to resist to the utmost the domination of the union. If we had needed anything to strengthen us in this conviction, it would have been found in the many letters which we have received commending our course. Lack of space prohibits publication of these letters, but a paragraph from a prominent company in Marion, Ind., which is as follows, expresses the sentiment generally entertained by those who have written:

We are pleased to see you take this stand, and trust that you will maintain your right to manage your own business in your own way, and make no concession to uninterested parties who seek to dictate to you in this matter. We assure you that you will have the heartiest support of every fair-minded man in the country, for we all know that it would be a calamity and against the best interests of the union man himself for the unions to be in any degree victorious in this matter.

The writer from Marion goes on to relate how three years ago the labor unions completely dominated the manufacturing industries of that city, but in time the demands became so unreasonable that the manufacturers united in a fight for the open shop, and today all the industries in the city, with one or two exceptions, are doing business on the open shop principle. "This result was achieved by the manufacturers and business men standing together for their rights and being honest with each other," says our correspondent.

Concerning the strike of the printers of the Penton Publishing Co. we are glad to be able to state that progress is steadily being made in our fight for the open shop. All our publications have appeared regularly and, since the first week of the strike, have contained the usual number of pages. Last week, for the first time since the strike was declared, all the type for *The Iron Trade Review* was set in our own shop. Intelligent men who are not controlled by any union are the only employes engaged on our publications.

THE MEETING OF MECHANICAL ENGINEERS.

The 52nd meeting of the American Society of Mechanical Engineers, an account of which appears elsewhere in the present issue, was the largest ever held. Indeed the number of members has become so great that the body is beginning to show the chief defect of extreme magnitude, unwieldiness. Some means of simplifying and expediting the work of the committees has become a necessity and one remedy for vexatious delays was proposed at the New York meeting and is to have a trial.

Hitherto it has been the practice in appointing committees to consider the claims of the different sections of the country in each, thus distributing the members over the widest extent of territory and increasing the difficulties of meeting and communication to the maximum. In a resolution passed near the close of the meeting, the president is directed to choose committee members with a view primarily to ease of communication. Thus the members of one committee will be grouped about Philadelphia, another will have its center in New York and likewise with other committees and industrial centers. The advantage of shortening the distance between those trying to work together is obvious and the plan might be considered with profit by other associations which find it difficult to accomplish results in the time available.

The substitution of a topical discussion for the reading of a series of set papers is another innovation which deserves the attention of association leaders.

In the discussion of bearings, which occupied all the time of one of the most profitable sessions, interest was concentrated upon one subject and not allowed to wander away among many topics to the detriment of all. This plan also has advantages which need no advocate.

Viewed as a whole the meeting was eminently satisfactory to all concerned. The business sessions might have been attended slightly more faithfully; but the social element is becoming more and more important in association assemblies and it is unreasonable to expect strict attention to business during convention week, especially when the place of meeting happens to be situated within easy distance of the attractions and distractions of New York. The chief purpose of these meetings is, after all, the pleasure of the participants, the pleasure of interchange of thought and experiences. Papers can be read quite as well at home before one's study fire, and quite as profitably.

ORES DETERMINE STEEL PROCESSES.

Editorial comment is made in a foreign contemporary on the rapid growth of basic steel manufacture in recent years in various countries, but a somewhat distorted view of the compelling conditions is taken as regards the relative employment of the open-hearth and Bessemer processes. In Germany two-thirds of the basic steel is made by the Bessemer process, while in the United States all the basic steel is made by the open-hearth process. Throughout this comment runs the strain that the employment of the Bessemer or open-hearth process is a matter of choice rather than of necessity. Indeed, the statement is directly made that "in the United States there is a greater variety of ores available for both purposes than in any other country" and this is followed by the statement that American practice must be based on the "belief that the open-hearth process lends itself in a special degree to the production of basic steel."

This conclusion is really somewhat wide of the mark. The basic open-hearth process is used in the United States not as a matter of choice, if basic steel is to be made at all, but because the commercially available ores are not admissible to any extent for the employment of the basic Bessemer process. A large percentage of phosphorus is necessary in basic Bessemer work to furnish the heat, which must be greater than with the acid Bessemer process, on account of the slag, and cannot be furnished to any extent by silicon, which attacks the lining. Campbell states, for instance, that in most basic Bessemer work the iron contains more than 3 percent of phosphorus, and intimates that it would require important changes in practice to permit the employment of iron "considerably" below 2 percent. Of all the Lake Superior ores now mined there is but one whose phosphorus content exceeds 1.31 percent of the iron content, and there are but three which show more than 1 percent. There is no hint of any important unworked deposits of highly phosphoric ores in Lake Superior regions. Those of the Virginia and Alabama ores which are comparatively high are still much below the practical limit for basic Bessemer work. A part of the Adirondack ores run from 1.35 to 2.25 percent in phosphorus and 60 percent in iron, but compared to the total ore supplies of the country these are unimportant, and are reduced in phosphorus by magnetic separation.

Germany is driven to the use of the basic Bessemer process almost exclusively for basic steel, because the ores available require it. In England basic steel is made about equally by the Bessemer and open-hearth processes. In Russia and Belgium the open-hearth predominates and in the United States it is supreme for the manufacture of basic steel. In all these cases the ores, and not the preference of manufacturers, determine the process employed. The alignment in the three principal steel making countries is as follows, using the statistics of 1904, in metric tons for Germany and gross tons for the other two countries:

STEEL INGOT PRODUCTION, 1904.

	Germany.		
	Basic.	Acid.	Total.
Bessemer	5,525,429	423,742	5,949,171
Open-hearth	2,697,760	130,546	2,828,306
Total	8,223,189	554,288	8,777,477
	Great Britain.		
	Basic.	Acid.	Total.
Bessemer	652,309	1,129,224	1,781,533
Open-hearth	662,064	2,583,282	3,245,346
Total	1,314,373	3,712,506	5,026,879
	United States.		
	Basic.	Acid.	Total.
Bessemer	.....	7,843,089	7,843,089
Open-hearth	5,007,448	597,884	5,605,332
Total	5,007,448	8,440,973	13,448,421

In Germany the production of acid open-hearth steel has remained practically stationary; in England it has decreased. In the United States also it has decreased, the 1904 production being the smallest since 1898, and this is particularly significant, since on account of the rapid general growth, even a relatively decadent branch of manufacture in the United States may show an increase in tonnage. It is pretty evident that the process has no great vitality as a tonnage proposition. The very fine grades of steel made by it and which have to a certain extent replaced crucible steel, are not tonnage makers. The acid open-hearth process yields to the acid Bessemer process. It does not yield directly to the basic open-hearth, nor is there much disposition in the United States for the Bessemer to yield to the basic open-hearth. There has been in the past few years, a limited amount of pig iron under the Bessemer limit in phosphorus which has been used in the basic open-hearth furnace, but the practice has not become general and is not likely to. The prediction of the late Mr. A. L. Holley, that the open-hearth process will

one day attend the funeral of the Bessemer process will never be fulfilled in the sense intended. The ores which are low enough in phosphorus to require no reduction in the process of steel making will find their way into steel through the acid Bessemer process and through no other. The ores which are higher in phosphorus will find their way into steel through the basic open-hearth process when their phosphorus content is not very large, and when it is, they will go through the basic Bessemer process. There is not, and will not be, any material latitude for choice between the basic open-hearth and the basic Bessemer processes: the phosphorus will decide. Nor will it be possible to introduce the element of choice, not by choosing the process after the ores, but by first choosing the ores and thus determining the process, for the reason that iron ore is already scarce in a commercial sense, the rich deposits, not too far removed from fuel and markets, having a high value in the ground. All the ore from which iron can be cheaply made and marketed will be used. If the open-hearth process ever attends the funeral of the Bessemer it will be because the ores for the latter, which must be either very high or very low in phosphorus, will have been exhausted.

In the United States the evidence is quite clear that the Bessemer process will not last longer than a few decades, when the present Bessemer ore reserves will have been exhausted, unless further large deposits are discovered. The present known deposits of ores suited to the basic open-hearth process will permit of production along this line continuing its rapid increase of the past few years, and the process outliving the Bessemer, while the trend of new exploitation of ores in the past few years has been towards increasing the known reserves of basic more than of Bessemer ores. For instance, the whole southern steel industry is based upon ore deposits which contain no Bessemer at all.

Two or three years ago it became evident that the American basic open-hearth steel industry, as at first established, could not indefinitely continue its rapid growth, without important changes. From only 776,256 gross tons of ingots and castings in 1896 the production grew in half a decade to 3,618,993 gross tons, in 1901, and last year the 5,000,000-ton mark was passed. In the earlier years large percentages of old material were used, and it was the cheapness of such old material which so greatly encouraged the early industry. The supply could not grow with commensurate rapidity, and the fact was first discussed in these columns on April 17, 1902, when the 1901 statistics had become available. The solution of the problem has been that the basic open-hearth steel process, having such inherent vitality, has been content to stand a somewhat higher relative manufacturing cost through the use of a greater percentage of pig iron, has developed some special processes which do not involve the use of scrap at all, has been paying a higher relative price for old material and has, last but not least, had scrap made for it by liberal and almost reckless cropping. A third of an ingot is frequently cropped, conducing to better quality in the finished product, and furnishing scrap for the open-hearth furnace. The cost of melting and casting is not high, and an endless chain runs from the furnace to the shear and back again. In this connection it is interesting to note that for the year 1904 the American Iron and Steel Association for the first time presented separate statistics of all rolled steel products and the total, compared with the statistics of production of steel ingots, excluding all castings, showed that for every 100 pounds of ingot production reported, there was less than 76 pounds of rolled steel reported. There is no doubt that the need of scrap, and the scarcity of old scrap, has had an important influence in making the gap so large. What will be done as the Bessemer process steadily decreases its proportionate contribution of scrap is for the future to decide. The basic open-hearth steel industry has shown such remarkable flexibility in methods in just a few years that it can be expected to solve all problems that may be presented.

Southern Consolidation.—The Southern Steel Co., of Gadsden, Ala., has been incorporated with a capitalization of $16,000,000 for the mining of iron ore and coal and the manufacture of iron and steel. The new enterprise, it is stated, will be a consolidation of the interests of the Alabama Steel & Wire Co. and the Underwood Coal & Iron Co. The stock is divided into $10,000,000 common and $6,000,000 preferred. The officers are Everett T. Schuler, Gadsden, president; George H. Schuler, Birmingham, vice president and treasurer; R. D. Carver, Birmingham, secretary; Harrison B. Schuler, Saratoga, Fla.; John Bindly, Pittsburg, C. Van Camp, Indianapolis and Moses Taylor and B. Van Courtlandt, New York, directors. Additions to the steel plant of the Alabama company, and the erection of a rod mill and another finishing plant are reported as among the plans of the new concern.

Developing New Ore Body.—The Hudson Iron Co., which owns and operates the blast furnace plant at Secaucus, N. J., has secured a long lease of a tract of land near Hackettstown, N. J., containing a valuable body of ore. Machinery is being installed and it is the intention to bring the capacity up to one hundred tons per day. The railroad being built by the company to carry ore from the old Forest of Dean property to the Hudson river is practically completed and delivery of ore is expected to begin about February 1. The output of pig iron is at present somewhat limited by the difficulty of securing an adequate supply of ore and will be greatly increased as soon as these ore lands can be put in condition to yield a sufficient supply.

A handsome booklet descriptive of the furnace of the Jefferson Iron Co., Jefferson, Tex., is being distributed. About five thousand acres of iron lands are owned, the ore being of good quality, the land is heavily timbered, making charcoal plentiful and cheap, coal and coke are said to be within easy reach and river improvements will soon give the plant deep water connection.

Machinery is being installed in the new plant of the Columbus Structural Iron Co., Columbus, O., and operation will begin the first of the year.

Securities Active Despite Disturbing Factors.

With the market generally admitted to be the most disturbed in this or any recent year and in spite of numerous and persistent discouraging circumstances, trading on the New York exchange was extremely active and a majority of securities closed with net advances, in several cases of importance. Money rates during the week went as high as 28 percent, a new record for the year, and the average was little below 20 percent. Russian securities sagged steadily and almost precipitated a panic on German and French exchanges, England had a change in ministry and in America congress met, both ordinarily disturbing factors, a couple of important railroads went into receivers' hands and New York banks again wiped out their reserves and marked up a substantial deficit. But all these forces which naturally should have occasioned one of the weakest markets of the year, were inadequate to stem the tide of speculation and trading was heavy though the cooler heads of Wall street termed it wild and inconsistent. The boomers, however, declared that securities had not yet been made to take sufficient notice of the remarkable prosperity of agriculture and industry and that prices were still in many cases too low. Union Pacific, Amalgamated Sugar and Amalgamated Copper chiefly held the attention of the more daring speculators and selling in these lines was terrific. Among the stocks more free from speculation Republic Iron & Steel, U. S. Cast Iron Pipe, Pressed Steel Car, Steel Foundries and Virginia Iron Coal & Coke recorded good advances. Rumors of a southern consolidation were still current and Tennessee Coal & Iron during the week set a new high record only to break it the next day, when it passed the 140 mark. Allis-Chalmers rose sharply and a number of other stocks were swept along in the general advance.

Financial Notes.

Recent dividend declarations are: American Car & Fdy., regular quarterly preferred 1¾ percent payable Jan. 1; Maryland Coal Co., semi-annual 2½ percent with extra of 2 percent, payable Dec. 30; American Car Co., regular quarterly preferred, 1¼ percent; Youngstown Sheet & Tube Co., quarterly, 1¼ percent, payable Jan. 1.

The General Electric Co. has filed with the New York authorities a certificate of increase in capitalization from $48,325,500 to $60,000,000.

The recent declaration of a one percent dividend on United States Cast Iron Pipe is believed to have been the first step toward placing the stock on a four per cent basis at an early date.

Earnings of the American Car & Fdy. Co. show an increase of $129,791 for three months and $215,589 for six months. The net for the quarter ending October 30 was $717,739.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quotation Dec. 2	Closing Quo. Dec. 9	Changes	Date of 1905 Ann. Meet.	Par Value	Capital Outstanding	Dividend Basis	Dividend Being Paid	Date Last Div. Dec.
Allis-Chalmers Co	19½	23¼	+3¾	Sept.	100	19,820,000	.....	.....	.....
Allis-Chalmers preferred	62	63¼	+3¼		100	16,150,000	7 cum	.....	Feb., 1904
American Can	9	8⅞	− ⅛	Feb.	100	41,233,300	.....	.....	.....
American Can preferred	70	70¾	+ ¾		100	41,233,300	7 cum	5 Q.	Jan., 1906
American Car and Foundry	40⅜	41	+ ⅝	June 29	100	30,000,000	.....	.....	May, 1905
American Car and Foundry preferred	100½	102	+1½		100	30,000,000	7 n. c.	7 Q.	Jan., 1906
American Locomotive	71	69¾	−1¼	Oct. 17	100	25,000,000	.....	.....	.....
American Locomotive preferred	117	117	.....		100	24,100,000	7 cum	7 Q.	Oct., 1905
American Shipbuilding	56½	56½	.....	Oct. 4	100	7,000,000	4	4 Q.	Dec., 1905
American Shipbuilding preferred	104½	104	− ½		100	7,900,000	7 n. c.	7 Q.	Oct., 1905
American Steel Foundries	12	13⅜	+1⅜	Oct. 3	100	17,700,000	.....	.....	.....
American Steel Foundries preferred	45½	49⅛	+4		100	17,700,000	6 cum	.....	Aug., 1904
Barney & Smith	18	18	.....	June 6	100	1,000,000	.....	.....	June, 1893
Barney & Smith preferred	125	125	.....		100	2,500,000	8 cum	8 Q.	Dec., 1905
Bethlehem Steel	34½	34	− ½	April 4	100	15,000,000	.....	.....	.....
Bethlehem Steel preferred	91⅛	90	−1⅛		100	15,000,000	7 n. c.	7 Q.	Nov., 1905
Bullock Electric preferred	114	114	.....	Oct. 1	100	1,000,000	6	6 Q.	Oct., 1905
Cambria Steel	28	28⅛	+ ⅛	March 21	50	45,000,000	6	3 S. A.	Aug., 1905
Cambria Iron	49	49	.....		50	8,468,000	4	4 S. A.	Oct., 1905
Colorado Fuel & Iron	45¾	47⅛	−1¾	Oct. 16	100	30,132,000	7	.....	Apr., 1902
Wm. Cramp & Sons Ship & Eng. Bldg. Co.	25	25	.....	May 25	100	6,098,000	5	.....	Nov.,1902
Crucible Steel	13⅜	13⅜	.....	Oct. 18	100	25,000,000	.....	.....	.....
Crucible Steel preferred	68⅛	67¾	− ⅜		100	25,000,000	7 cum	.....	Sept., 903
Empire Steel	6	6	.....	Feb. 22	100	2,281,400	.....	.....	.....
Empire Steel preferred	35	35	.....		100	2,500,000	6 cum	3 S. A.	Jan., 1901
Fay & Egan	90	90	.....	Feb. 21	100	1,000,000	5	5 Q.	Nov.,1905
Fay & Egan preferred	20	120	.....		100	1,000,000	7 cum	7 Q.	Nov.,9055
General Electric	184	184½	+ ½	May 9	100	48,256,050	8	8 Q.	Oct., 1905
International Pump	28	27	−1	June 6	100	12,282,500	.....	2	July, 1905
International Pump preferred	82	82	.....		100	8,850,000	6 cum	6 Q.	Nov.,1905
Lackawanna Steel	79½	81	+1½	March 8	100	34,971,400	.....	.....	
Lake Superior Corporation	17	17	.....		100	40,000,000	.....	.....	
Niles-Bement-Pond	121	121	.....	Feb. 1	100	5,000,000	6	6 Q.	Sept.,1905
Niles-Bement-Pond preferred	103⅝	103⅝	.....		100	2,000,000	6 cum	6 Q.	Nov., 1905
Otis Elevator Co	62	60	−2	March 20	100	6,350,300	2	2 A.	Apr., 1905
Otis Elevator Co. preferred	107	107	.....		100	5,589,500	6 n. c.	6 Q.	Oct., 1905
Pittsburg Coal Co	13⅝	14½	+ ⅞	Feb. 11	100	30,135,000	.....	.....	.....
Pittsburg Coal preferred	57	56	−1		100	30,716,200	7	.....	Apr., 1905
Pressed Steel Car	52¼	57⅞	+5⅝	Feb. 15	100	12,500,000	3	3	Aug., 1904
Pressed Steel Car preferred	99	100⅞	+1⅞		100	12,500,000	7 n. c.	7 Q.	Nov., 1905
Pullman Palace Car	250	242	−8	Oct. 19	100	74,000,000	8	8 Q.	Nov., 1905
Railway Steel Spring	61¼	62¼	+1	March 2	100	13,500,000	.....	4 S. A.	Oct., 1905
Railway Steel Spring preferred	103⅞	103	− ⅞		100	13,500,000	7 cum	7 Q.	Dec., 1905
Republic Iron & Steel	33⅜	35½	+2⅛	Oct. 18	100	27,352,000	.....	.....	.....
Republic Iron & Steel preferred	104⅛	106¼	+1⅝		100	20,852,000	7 cum	7 Q.	Jan., 1906
Sloss-Sheffield	80	90⅝	+10⅝	March 15	100	7,500,000	5	5	Oct., 1905
Sloss Sheffield preferred	114¾	112	−2¾		100	6,700,000	7 n. c.	7 Q.	Oct., 1905
Tennessee Coal & Iron	123½	135½	+12	May	100	22,552,800	.....	4 Q.	Nov., 1905
U. S. Cast Iron Pipe & Foundry	41⅜	46½	+5⅛	June 23	100	12,500,000	.....	1	Dec., 1905
U. S. Cast Iron Pipe & Foundry preferred	94	94⅜	+ ⅜		100	12,500,000	7 n. c.	7	Dec., 1905
U. S. Steel	36⅛	37¼	+1⅛	April 17	100	508,302,500	.....	.....	Dec., 1903
U. S. Steel preferred	103⅜	104⅝	+1⅛		100	360,281,100	7 cum	7 Q.	Nov., 1905
U. S. Steel 5's	96⅞	96⅝	− ⅛		100	463,798,000	5	5 A.	
Virginia Iron, Coal & Coke	49	52¾	+3¼	Sept. 19	100	8,641,600	.....	.....	.....
Westinghouse Electric	174½	172	−2½	June 28	50	20,996,350	10	10 Q.	Oct., 1905
Westinghouse Air Brake	157⅛	157⅛	.....	Oct. 3	50	10,990,450	20	20 Q.	Oct., 1905

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., December 6 (

Pig Tin.—Tin has reached the highest level since 1888. Heavy buying and light supplies have again advanced the market. Shipments from abroad have been light. Today's quotations follow. Sept. and December, 35.70 to 35.87½; January, 35⅝ to 35.80; February, 35½ to 35¾; London, £163 5s and £162. Arrivals for the month to date, 550; afloat, 1,970.

Copper.—The conditions which have been sending copper prices upward continued to exert their influence during the week and prices for jobbing lots are now the highest in history. Available metal is scarce. Today's closings follow: Lake and electrolytic, 18¼ to 18½; casting, 18 to 18¼; London's closing today: £79 12s 6d and £79 26s. Exports for the month to date, 4,559 tons.

Lead.—A good demand and limited supplies have also sent the lead market upward. Large orders have been placed abroad. Today's closings: 5.90 to 6.10; St. Louis 5.75; London, £17 2s 6d.

Spelter.—Refined spelter has been in good demand with light offerings. Today's closings: 6.40 to 6.50; St. Louis, 6.30; London, £28 12s 6d.

Antimony.—The demand has been fair, and today's quotations are: Cookson's and Hallett's, 13¼ to 13¾; other grades, 12¾ to 13¼.

HEAVY RAIL ORDERS.

(Special Telegram.)

NEW YORK, Dec. 13.—Rail sales of the week include 15,000 tons to the Harriman Lines, and 5,000 tons to the Wabash, both additional orders, 6,000 to the Maine Central and 4,000 to the Hocking Valley. Unofficial estimates are that the Steel Corporation will start the new year with over six million tons on its books.

Crucible Plans Improvements.—At a meeting of the board of directors of the Crucible Steel Co., of America, held in the company offices in the Frick building, Pittsburg, on Tuesday of this week a dividend of 1 percent was declared on the preferred stock, payable December 29. This is the first dividend declared by the company in two years. It is thought the regular 7 percent dividend will be resumed after the first of the year, as the company is in excellent condition and has business booked ahead enough to keep them running practically to capacity throughout 1906. A larger dividend was not declared at this time in order that the funds of the company may be used for betterment. Among the improvements planned is an extension of the Atha works that will greatly increase its capacity. This plant is at Harrison, near Newark, N. J. All of the plants of the company are in full operation and from the business on the books and in sight they will run steadily through the coming year. Of the 11 plants that were taken over when the company was formed nine are operating, two having been sold, one at Beaver Falls and the other at Portsmouth, O. The works now owned are the La Belle, Allegheny; Black Diamond, Crescent, Howe-Brown and Singer-Nimick, Pittsburg; Anderson-DePuy McKees Rocks, Aliquippa works at Aliquippa and the Atha works at Newark, N. J.

The report is current, though without official confirmation, that the Follansbee Brothers Co., Pittsburg, with sheet and tin mills at Follansbee, W. Va., will erect a new open-hearth plant costing $250,000 to supply its own demands.

CARNEGIE TECHNICAL SCHOOLS.

Inspected by Pittsburg Foundrymen's Association.—Co-operation is Asked.

The December monthly meeting of the Pittsburg Foundrymen's association was a departure from the ordinary inasmuch as no papers were read or discussed. Instead the members, to the number of nearly 100, held a banquet at Hotel Henry and after the introduction of Prof. C. B. Connelley, of Carnegie Technical School, the association adjourned to the Technical school, which was thrown open for their inspection and the evening was profitably spent in examination of the facilities of the institution toward giving its students a technical education. Under the guidance of Director Arthur Hamerschlag and Prof. Connelley the members were conducted through the entire institution so far as it is completed and the aims and objects of the school were gone into in detail for the benefit of those present.

There are now 366 students regularly enrolled in the School of Apprentices and Journeymen and of those 120 are in the day classes, 144 in the regular night classes, 144 in the special night classes and 58 in the architectural department. Only seven buildings of the whole, which when completed will occupy 32 acres of ground, have been completed and members of the association were shown through the machine shop, pattern shop, forging shop, foundry, engine room, chemical laboratory, department of mechanical drawing and architectural departments and concluded by listening to an address by Director Hamerschlag, who asked the foundrymen, as an association which has hitherto worked among its members alone, to take up the subject of the technical school, hold their meetings in the auditorium and allow the students, who are interested in all practical matters of interest to the foundrymen from a practical standpoint, to listen to the papers read and discussed. He asked the foundrymen to advise their men to attend the school, said that a new era was dawning and that five years from now the students of the school would have the theory as well as the practice and would be the men to solve successfully the problems of output, quality and rate of production which are now confronting the foundrymen. He said the institution needed applicants for courses in pattern making and journeymen molders as well as for the course in shop mathematics, that these men would get the benefit of a foundry course in practice, side by side with the enginering courses as well as the metallurgical and laboratory departments. Speaking of the benefits of these courses of instruction he said force against force never accomplished anything but that education properly applied brought results. A majority of the students, he said, worked during the day, got their practical experience in the shops and foundries and attended the schools at night and obtained their theory, and that this combination gave them the essential qualifications to make good in what they undertook.

On a motion by President B. D. Fuller, of the Pittsburg Foundrymen's association, Director Hamerschlag, the school and faculty was given a rising vote of thanks for their hospitality.

Schwab Will Not Buy.—Negotiations which have been under way for the sale of the Kelley Nail & Iron Co. and the Belfont Iron Works Co., of Ironton, Ohio, and the Norton Iron Works Co. and the Ashland Steel Co., of Ashland, Ky., to Chas. M. Schwab have failed of consummation. The deal had progressed to a point where the four properties were offered to Mr. Schwab for about $3,000,000. The companies have an aggregate capitalization of about $2,000,000. Mr. D. B. Meacham, of Rogers, Brown & Co., who conducted the negotiations on behalf of the four companies states that the proposition has not been accepted and that the matter is now a closed incident.

IRON ORE SHIPPING RECORDS

Established by Vermillion and Mesabi Ranges.—New Mines Showing up Well.

(Special Correspondence.)

DULUTH, MINN., Dec. 12.—The shipments of the Vermillion range for the year have been as follows: Chandler, 365,739; Minnesota, 204,782; Pioneer, 653,673; Savoy, 91,775; Sibley, 250,934; Zenith, 109,911. This is a total of 1,676,714, about 400,000 tons above the year before.

Figures on most mines of the Mesabi for the year follow: Adams, 1,747,202; Ajax, 28,439; Bessemer, 112,619; Biwabik, 1,092,048; Bust, 1,860,453; Cass, 61,584; Chemung, 133,730; Chisholm, 231,295; Cincinnati, 965; Clark, 358,056; Duluth, 142,172; Elba, 125,724; Fayal, 1,358,588; Genoa, 281,058; Glen, 287,667; Hector, 4,990; Higgins, 104,869; Holland, 158,484; Interstate Mng. Co., 325,777; Iroquois, 61,109; Laura, 27,207; La Belle, 78,597; Leonard, 296,386; Lake Superior, 504,055; Mahoning, 1,020,000; Malta, 140,853; Miller, 113,520; Minorca, 117,630; Morris, 1,070,926; Mountain Iron, 2,494,913; Ohio, 396,248; Oliver, 55,920; Pettit, 140,239; Pittsburg, 161,912; St. Clair, 61,792; Sellers, 261,478; Shenango, 208,560; Sparta, 27,778; Stevenson, 1,450,000; Troy, 87,584; Wills, 4,550. The astonishing thing about these figures is the great tonnage from individual mines. The eight-million-ton mines have produced 11,000,000 gross tons in the season, or as much as the entire lake region no farther back than 1896. The Morris mine a million-ton producer, was not developed for shipping until spring, and did not begin to send forward ore before June. Such a record is something marvellous. Mountain Iron is, of course, 500,000 tons above the previous record year of the largest shipper.

Pewabic shipments for the year have been 550,000 tons; Vulcan, East Vulcan and Curry, 450,000 tons; Chapin, 975,000 tons; Antoine Ore Co., 138,500 tons; Baltic, 150,000 tons, Corrigan, McKinney & Co., 675,000 tons. These are chief shippers off the Menominee range. Shipments of iron ore from all the mines on the Duluth & Iron Range road for the season amounted to 7,778,768 tons for the season; the Mesabi and Vermillion range shipments over this road increased 3,218,369 tons.

Complete Electric Plant.

What will be the most complete mine electric plant in the lake region is to be installed by the General Electric Co., of Schenectady, at the Perin Iron Mining Co.'s mines at Norway. Power will be derived from a 22-foot head, at the mouth of Sturgeon river, where it falls into the Menominee, and will be carried by wire at 13,000 volts, 6 miles to the mines. A line for 4,000 h. p. is to be installed at once, though only half that will be used for a time. All hoisting, air compressing and pumping will be electrical, and the arrangements of plant are new and unique in many respects. General Manager Kelley, returned a few days ago from Cambria and Philadelphia, where he went to consult finally as to the system, and at once on his return the contract was made through R. A. Swain, who represents the General Electric Co. on the upper lakes. The mining company is building its own dam and transmission line, and the General Electric Co.'s initial contract is for about $80,000.

The three compartment vertical shaft being sunk on the section 30 property, near Ely, Vermillion range, is down 65 feet, and is progressing through jasper about 18 inches per 20 hours. Sinking in that material is very hard, slow work.

A shaft 8 x 10 ft. is being sunk at Palmer, Cascade range, on a showing of good ore in the Star West lease of Corrigan, McKinney & Co. It is down 60 feet, and ore was cut in a drift at 50 ft. At that point it was but 3 ft. wide. At 100 ft. another drift will be run to the ore body.

Ore shipments from Escanaba this year were 250,000 tons over Milwaukee docks and 3,850,000 over the Northwestern. The Milwaukee has made a big jump from last year, and will do still better in 1906, with the additional facilities in both rolling stock and docks that it will then have. From Ashland total shipments were about 3,400,000, of which the Northwestern had about three-fourths; from Marquette there were 3,000,000 tons, of which the Lake Superior and Ishpeming had nearly two-thirds.

No. 3 ore dock of the Great Northern road at the head of the lake, will be extended 1,000 ft. to the channel line. A contract for the job has been let, and work is begun. This will make No. 3 as large as No. 2, giving it about 87,500 tons storage capacity, and ranking the two lower than only one dock on the lakes, new No. 4 of the Duluth, Missabe & Northern road, which is also under contract now.

PERSONAL.

Niles Anderson succeeds E. B. Blandy as the New York representative of Matthew Addy & Co.

W. W. Young has been appointed purchasing agent of the Union Switch & Signal Co., Swissvale, Pa.

Charles Heggie succeeds W. A. Green, recently resigned as general manager of the Scully Steel & Iron Co., Chicago.

Eli H. Doud was elected president of the Acorn Brass Mfg. Co., Chicago, at its last annual meeting. Mr. Doud was formerly secretary and treasurer of the company.

Joseph L. Hummer retires as general foreman of the special machine and gasoline engine departments at the Deering Works, International Harvester Co., Chicago, to take the position of master mechanic at the Studebaker Works, South Bend, Ind.

A. B. Conover has been chosen treasurer and general manager of the Chicago office of John A. Roebling's Sons Co., to succeed the late George C. Bailey, Mr. Conover has been for nearly 20 years Western representative and general sales agent of the company.

Thos. E. Davey has resigned as secretary and director of the Finished Steel Co., which operates a steel shafting plant at Hazelton, near Youngstown, O. The duties performed by Mr. Davey have been transferred to William J. Fitzsimmons, general manager of the company.

Salustio Beeche, owing to impaired health, has ceased to be an active member of the firm of Beeche, Duval & Co., Valparaiso and New York, and has become a special partner, the name of the firm being changed to Wessel, Duval & Co., its personnel remaining otherwise unchanged.

Frank Jeffrey, formerly vice president of the Union Iron Works, of the United States Ship Building Co., San Francisco, and later superintendent of the Wyandotte and Bay City, Mich., yards of the American Ship Building Co., has been appointed superintendent of the Detroit Ship Building Co.

A. Emrie, for several years superintendent of the Allis-Chalmers Co.'s Milwaukee works, and A. M. Mattice, who went there several years ago to succeed Assistant General Superintendent James S. Church, now principal of the Milwaukee School of Trades, have resigned. According to present plans, no one will be named to succeed either. A. P. Peck has joined the staff of salesmen.

The tonnage men of the plate department of the W. Dewees Wood sheet steel plant, McKeesport, Pa., have been asked to accept a twenty-five percent reduction in wages, the cut to become effective with the new year.

The Fawcus Machine Co., Pittsburg, has decided to increase its capacity one-third by the erection of an additional building 30 x 110 feet and the enlarging of its machine and erecting shops and offices.

WILL NOT PRESENT SCALE.

Amalgamated Association Not Strong Enough in the Eastern District.

There is no foundaton at this time for the story which has been given widespread publication by the daily press to the effect that the Amalgamated Association of Iron, Steel & Tin Workers was about to present its scale to manufacturers in the eastern district. The association lost the eastern district during the big strike ten years ago and has never regained it. At the recent convention in Detroit it was decided to put organizers into this district and build up the local lodges and this is being done energetically, but the national officers do not feel the time has yet come to present the scale, and in addition to this, this is not the time of year these matters are taken up. President McArdle has been on the road practically all the time since he took office and will himself go into the eastern district within a few weeks to attend a series of revival meetings among members of his association, but no scale will be presented until next spring.

Notes In the Labor Field.

The puddlers at the Youngstown works of the Republic Iron & Steel Co., at the next bi-monthly settlement expect to get an advance of at least 25c per ton for the next two months and from reports being received at the national headquarters anticipate a $6 scale by April 1. The scale is now $5.50.

Joseph W. Rutledge, one of the vice presidents of the Amalgamated Association, has resigned his position, effective Dec. 1, and President McArdle has appointed Ben E. Davis to succeed him.

Of the eleven foundries in Philadelphia, whose men went on strike Oct. 23, all have been opened except one. About 50 percent of the men who struck have been replaced and in several cases strikers have given up their union cards and gone back to work as non-union workmen.

The National Association of Manufacturers reports that in the forty-two cities where printers' strikes are on and where the Typothetae is organized the United Typothetae has 700 members; sixteen have yielded. It looks as if the open shop would prevail in every Typothetae city where a strike was called. Open shop printers in Cincinnati are having to buy new presses.

The Pennsylvania State Association of Builders' Exchange, at the annual meeting recently held at Pittsburg, adopted resolutions declaring strongly for the open shop. This action binds thousands of Pennsylvania contractors and architects to combat the closed-shop principle.

Wage agreements are being signed by workmen of the American Sheet Steel Co. on practically the same basis as that under which they have been employed during the current year. In the union mills the Amalgamated Association scale will remain in force until July 1.

Ten thousand structural iron workers in New York found in their pay envelopes last week a circular announcing in effect that the open shop had been officially introduced. No discrimination will be made between union and non-union men.

The Wheeling Enameled Iron Co., Wheeling, W. Va., has taken over the plant of the Heating, Ventilating & Foundry Co. at Elm Grove, W. Va., to manufacture "Porceliron" products. Besides equipping the foundry for its new uses, the company will erect three buildings, one 50 x 170 feet for the enameling department, one 50 x 60 for the grinding rooms and one 50 x 40 for a box factory. The company expects to have its products on the market by March 1.

DEATH OF WILLIAM CHISHOLM.

WILLIAM CHISHOLM.

William Chisholm, identified with many iron and steel concerns in and about Cleveland, dropped dead in a tailor shop Dec. 6. He was sixty-two years of age. Mr. Chisholm graduated from the Philadelphia Polytechnic College and went to Chicago as president and manager of the Union Rolling Mill Co., which his father had established; this concern was later acquired by the Illinois Steel Co. In 1880 he assumed temporary management of the Cleveland Rolling Mill Co. and upon the death of his father a year later he became president and manager, a position he retained until the plant was sold to the American Steel & Wire Co. He then retired from active business life, though retaining his interest as vice president in the Union Steel Screw Co., as director of the Lakeside & Marblehead Railroad Co., and in the Kelley Island Lime & Transport Co., the Riverside Foundry Co. and various banking and transportation concerns. He was a prominent philanthropist, being president of the Cleveland Protestant Orphan Asylum at the time of his death. He served a term as president of the Union club. Alva S. Chisholm, his son, is assistant to President Palmer of the American Steel & Wire Co.

Dinner to President Dinkey.—The elegant new home of the Union club, Cleveland, was thrown open to the members Wednesday, Dec. 6, and the first function was a dinner tendered President Dinkey, of the Carnegie Steel Co., the following evening, by the Bessemer Pig Iron Association. Covers were laid for 15, including Mr. Dinkey and Mr. S. A. Benner, gen'l sales agent of the Carnegie Steel Co. Mr. J. G. Butler Jr., was toastmaster and presided in an exceedingly happy manner, calling upon all present to respond to informal toasts. Mr. Dinkey, in accounting for the success of the Carnegie company, highly complimented superintendents and others in responsible positions, for their efficient service, making records which he declared eclipsed those of their predecessors, including himself. Another speaker recalled the days when Andrew Carnegie came to Cleveland to buy ore, and was told to go back to Pittsburg and "fix up" his credits.

Philadelphia Foundrymen:—The Philadelphia Foundrymen's Association, at its 152nd meeting, held at the Manufacturers' Club, Dec. 6, renominated President Thomas Devlin, and all the other officers for the ensuing year, the only change being the selection of George C. Davis to fill the vacancy in the executve committee caused by the resignation of Thomas B. Harkins. The treasurer's report showed a balance of $1,950 with all bills paid. The meeting was addressed by Samuel C. Lindsay, secretary of the National Child Labor Committee, of New Jersey, who spoke on the Pennsylvania law and its defects, and by A. J. McKelway, of Charlotte, N. C.

The heavy increase in building operations of the earlier months of 1905, was maintained in November, according to the *Construction News*, which reports official permits in thirty-two leading cities, for buildings to cost $41,365,518 against $33,547,140 for the same month last year, a twenty-three percent increase.

The office of the Riverside Engine Co., is at Oil City, Pa., where it is adding to the engine works recently acquired from J. B. Smithman.

Plant of Advance Thresher Co., Battle Creek.

The Advance Thresher Co., Battle Creek Mich., manufactures threshers and traction engines separators, feeders, corn husking and shredding machinery, and other classes of agricultural machinery. Some

GENERAL VIEW OF PLANT, OFFICE BUILDING IN FOREGROUND.

idea of the variety will be had from the following figures: The company makes 27 engines per week, 50 separators per week, 50 feeders for separators per week, 1,000 water tanks per year, 2,500 grain elevators and weighers per year, including seven different kinds, 800 corn huskers per year. To suit different classes of work, five different kinds of water tanks are made, 14 styles of separators and several styles of engines. In addition to this they make horsepowers, baggers, wind stackers, and many other styles or kinds of machinery. The plant has grown from a small beginning to an industry employing between 700 and 800 men. The buildings cover a tract of about 20 acres located in the outskirts of Battle Creek. The office building and power plant are situated at the front of the property, and behind these are arranged the different shops. While the general layout of the buildings is the result of growth and constant additions, the different departments have been so arranged in the buildings that the work passes through without any of it having to be taken over the same ground twice. In general, the manufacturing departments are located along the railroad track, which extends the entire length of the one side of the plant. These include the foundry, machine shops, blacksmith and woodworking departments. The power plant is also on the railroad, which makes the delivery of the fuel supply convenient.

Foundry Department.

The foundry department is situated in a building 100 x 300 ft. with a cleaning room 100 x 100 ft. at one end, and two wings, one for the cupola house, sand and coke storage, and the other for the core department. The construction of the roofs of all of the buildings is interesting. The general arrangement is a flat roof, carried on steel trusses, with a series of skylights constructed on a saw tooth roof plan, which introduces ample supply of north light without a shadow. In the general view showing the yard the saw tooth skylights can be seen on the roofs at the right and left. They can also be seen on several of the interiors.

The method of handling the pig iron and coke to the cupola has been very carefully worked out. The iron is stored in a yard adjoining the railroad track at one side of the foundry. A transfer car travels the entire length of the yard upon a track which is sunk a few inches below the general yard level. The pig iron charges are placed upon small iron buggies, the construction of which is adapted to easy handling on the charging platform, and differs from the transfer truck used on the upper floor. The small charging buggies are run on the transfer table and taken to the cupola house, and there raised to the charging platform by an elevator. In charging, all iron is gotten up onto the charging platform before charging begins.

GENERAL VIEW OF YARD. ENGINE TESTING BUILDING ON RIGHT, ENGINE ERECTING SHOP ON LEFT.

ENGINE MACHINE SHOP.

VIEW IN WOOD WORKING DEPARTMENT. NOTE TRUCKS FOR CARRYING WORK.

Adjoining the charging platform on one end is the coke storage; the floor of the storage being level with the charging platform so that the coke barrows may be loaded and run directly to the cupola. The coke is put into the storage by an elevator at one end of the plant. The storage holds an entire winter supply of coke. Beneath the coke storage are situated the sand storage bins, which also have sufficient capacity to hold a winter supply of molding sand, seacoal, fireclay, etc.

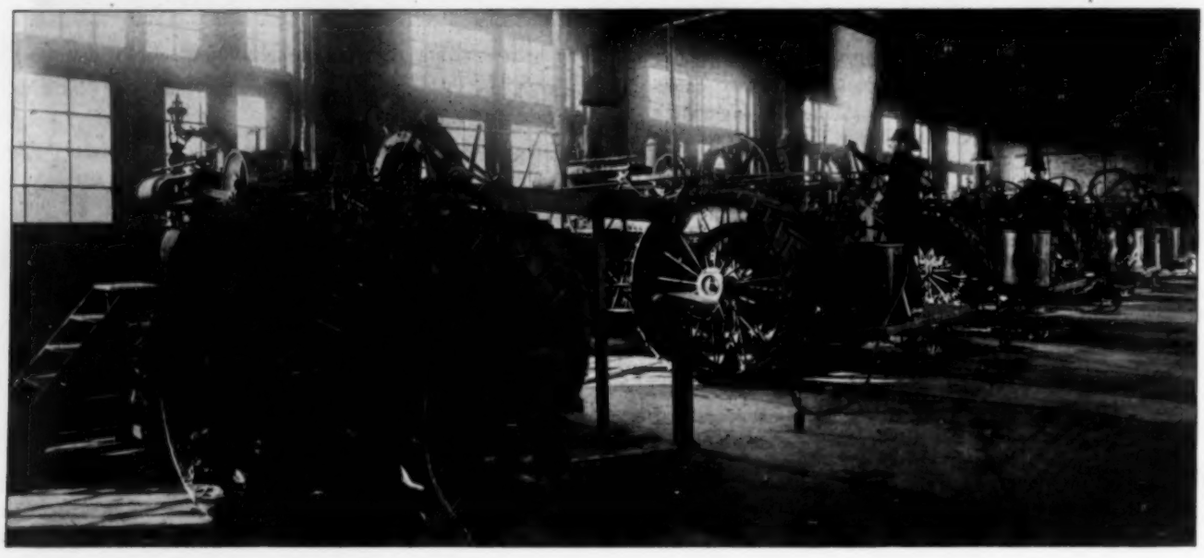
At present the foundry is equipped with one cupola, 66 in. inside of the lining. The blast is furnished for the cupola by a Connersville blower, belted to an electric motor. The cupola was manufactured by Byram & Co.

Next to the cupola, on one side, is located a ladle drying oven, which is constructed very much like a core oven, and it is used for drying both the large and small ladles.

While some fairly heavy work is made in this foundry, it is also highly specialized, and it has been found far more advantageous to use special hoisting appliances on the different floors and to carry the iron by a trolley system than to use a traveling crane covering the entire foundry floor. By means of suitable switches and turnouts the trolley system is so arranged that the ladles going from the cupola to the floors never interefere with the empty ladles returning to the cupola. The arrangement of the tracks at the cupola is very clearly shown in one of the accompanying illustrations.

For handling the patterns, molds and castings on the individual floors, small hand operated traveling cranes, connected with pneumatic hoists, are arranged to run on the lower cords of the roof trusses. These cranes travel across the foundry over the floors they are to serve, and in such cases the regular trolley system brings the iron to the floor and the traveling crane handles the ladle while the molds are being poured. In a system of this kind one crane is never in the way of another.

When the castings are shaken out, the large ones are taken to the cleaning room by the trolley system which is arranged with a slight grade toward the cleaning room situated at one end of the foundry. The small castings are put into suitable tote boxes, which are then taken by a hoist on the trolley system and run to the cleaning department. The scrap together with the sprues and gates are also thrown into the tote boxes, and taken to the elevator leading to the charging platform, where the boxes are placed on the transfer table and hoisted to the charg-



ENGINE TESTING ROOM.

ing floor. On the charging floor a small section of trolley track, together with a triplex chain hoist, is provided for unloading such boxes.

The cleaning department, which is situated at one end of the foundry, is equipped with 16 exhaust mills, furnished by Byram & Co., of Detroit, Mich. These mills vary in size from 16 in. in diameter by 36 in. in length, to

ENGINE ERECTING DEPARTMENT.

4 ft. 6 in. in diameter by 4 ft. 6 in. in length. There are also six grinding stands with benches upon which the workmen pile the castings.

For convenience in handling the castings in the cleaning department, special trucks are provided. The trolley system also passes entirely around the cleaning barrels, so that they can be charged or discharged with the aid of the trolley system. In addition each pair of mills has an auxiliary trolley for handling the doors and placing the castings. The battery also contains one dry cinder mill for cleaning the dump.

The different floors of the foundry are fitted up specially for the different classes of work. One of the most interesting jobs in the plant is the driving wheel job. These wheels are fitted with spiral cleats cast on the outside of the wheel.

Some of these molds in various stages of completion are plainly shown in one of the accompanying illustrations. The interior portion of the wheel is made in green sand. The exterior is formed in a series of chills which are set up about the cores, surrounded with a suitable frame and backed up by ramming sand behind the chills. This produces a wheel with a chilled face which insures good wearing qualities. Over each of these wheel floors there are two hand traveling cranes. In all there are eight of these cranes in the foundry, each being fitted with a pneumatic hoist.

The core department which is situated in a bay at one side of the foundry is provided with two core ovens. The larger oven has a series of shelves around the outside and a car in the center. For lighting the oven, an arc electric light has been suspended in front with a reflector on it which throws the light into the oven very effectively. Back of the large oven there is an oven provided with pipes through which the hot gases flow, and upon which the plates of cores are placed.

Adjoining the cleaning department at the front of the foundry are situated the foundry office and the flask shop. The flask shop is equipped with the necessary tools for making and repairing wooden or iron flasks. In the main foundry office provision is made for two clerks to look after the foundry accounting, and there is also an office for the foundry superintendent. On account of the fact that a large amount of duplicate work is made, it is necessary to check the deductions, and also the good and bad castings very closely, to prevent either shortage or over castings on an order.

Pattern Storage.

Over the cleaning department, flask shop and foundry office is located the pattern storage department. The floor of the pattern storage is of fire-proof construction and the room is separated from the foundry by fire-proof doors. The windows are made of wire mesh glass, and every possible precaution taken to reduce fire risks. The patterns are stored on adjustable shelves, the shelves being supported on brackets, clamped onto pipe columns. All patterns with match boards are stored in this department, the large and heavy patterns being stored on the floor and the small ones on the shelves.

In connection with the subject of matches, it may be of interest to know that the match boards used in the foundry are made from the dust which is collected in the dust catching chamber into which the pipes from the exhaust tumbling barrels discharge. This dust is mixed with linseed oil and used in making the matches. The material has to be mixed a small amount at a time for the rapid oxidation of the oil which takes place heats the material rapidly and it soon sets and becomes useless. When this dust is used no litharge is necessary and hence the matches are of a very much cheaper construction than in the case of the ordinary oil sand match.

Blacksmith Shop.

In manufacturing agricultural machinery a large number of fairly intricate forgings are required, and to produce these the blacksmith shop is equipped with a bulldozer, a Bradley hammer, a vertical power hammer, a punch, and the other necessary tools and appliances. The blacksmith shop is also so situated that the material passes from it directly to the machine shop.

Machine Shops.

There are several machine shops connected to the plant. The engine machine shop is situated near the engine erecting shop, and is equipped with all the necessary tools for the manufacture of engines. The forgings for this class of work are delivered from the forge shop to the machine shop in all cases in which machine work is necessary. The larger engine castings are delivered to the machine shop as required; while the smaller castings are stored in bins in the yard adjoining the machine shop. In fact, this bin storage system is used throughout the entire plant, and the castings required for any given department are stored in bins adjoining the department.

A great deal of attention has been given to the method

FORGE SHOP.

of handling the work from one department to another, and trucks are used very extensively. In cases where heavy pieces have to be handled, trolley systems have been installed.

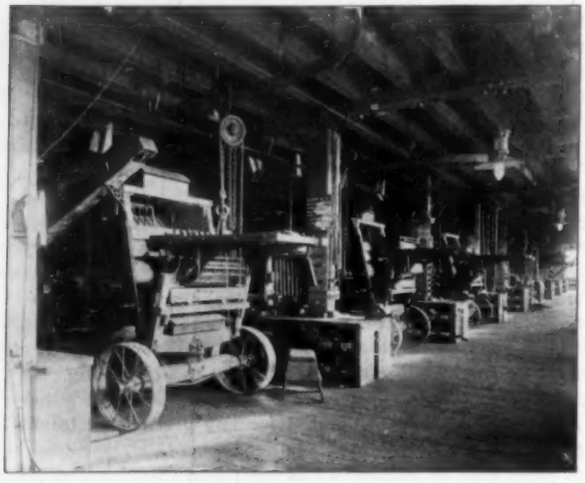
Engine Erecting and Testing Departments.

Adjoining the machine shop are the engine erecting and testing departments. The boilers are brought in from the boiler storage, which is located at one end of the erecting shop, and are first placed on the floor bottom up. The

various fittings for carrying the wheels and axles are attached while the boiler is in this position. The boiler is then raised by a traveling crane, turned over and the rest of the engine equipment assembled. The wheels are finally put on and the engine and boiler tested by means of steam from a stationary boiler. As soon as everything is in order the doors at the side of the shop are opened and the engine run across an open yard to the testing building, where each engine is tested under break load, the boilers being fired in the ordinary way. The engine is also tested in the yard under its own steam. After the engine passes inspection, it is run to the engine paint shop where it is cleaned, painted and prepared for shipment.

Woodworking Department.

The separators, stackers, and in fact most of the machinery aside from the engines require a considerable amount of wood work. To meet this demand a number of the departments are fitted up with a complete equipment of woodworking machinery. These departments are equipped with the very latest design of machinery and all of the material required in the manufacture of the various machines is gotten out, the lumber being brought in in one end of the department, and as it passes through suc-



SEPARATOR ERECTING SHOP.

cessive operations are performed. The truck system is used throughout for handling the material being operated upon. As soon as the woodwork is finished it passes through the dipping department and then to the storage from which the parts are taken to the erecting department as needed. The first operations in the woodworking department are conducted on the ground floor. The material is then elevated to the second floor and the finished pieces stored over the various erecting shops.

Separator, Erecting and Paint Shops.

After the various parts have all been collected in the bins the erection goes forward by sending a truck from bin to bin gathering the parts for a machine. These parts are then taken to the erecting floor. Each machine is located in a separate bay and a trolley hoist arranged for lifting the larger pieces in place. The machines are tested as they are erected and when complete are run out into the paint shop. In the paint shop the machines are given successive coats of paint and varnish, and are so arranged that every machine in any one row is at the same stage. When finished they are all drawn out at the same time, so that once a machine is in the paint shop it is never moved until completed and is then taken to the storage sheds or shipping room.

General Plant Equipment.

The offices are located in a suitable building at the front of the plant. The drawing room is located on the second floor of one of the buildings near the center of the plant adjoining the pattern shop, which is certainly a logical place for this department.

For driving the machine tools throughout the plant the group plan has been largely adopted, the groups being driven by induction motors. Thirty-five of these motors are used in various parts of the plant. The larger machines are driven by direct connected motors.

For fire protection two night watchmen are kept on constant duty and there are 80 clocks stationed throughout the plant. In the buildings there are 54 stations equipped with 50 ft. of one-inch hose each and an incandescent light is kept constantly burning by each one of these hose stations. In the yard there are 11 city hydrants and near each is 100 ft. of 2½ in. rubber hose. The plant is divided into 12 sections each having a fire alarm box which connects with the fire station across the street. The yard is well lighted by arc lights during the night.

The various buildings, two stories in height, are connected with overhead bridges so that the material may be moved from one building to another without its ever having to turn back. The yard between the buildings is paved with a block pavement. The plant covers 40 acres and has 3,500 ft. of frontage along the railroad, with three lines of side track the entire length of the plant. The yard is also equipped with a very efficient storm sewer system for carrying away rain water.

THE GUNNELL HOSE COUPLER.

The Gunnell Machine Co., Manitowoc, Wis., is bringing to the attention of buyers its new coupler for pneumatic and water hose. A number of desirable features are claimed for this device among them that the coupler is absolutely tight, that both parts are alike, that gaskets can not blow or fall out and that the coupling can be made by a quarter turn of the hose. Each part is made with two lugs as shown in the illustration which inter-

HOSE TO HOSE CONNECTIONS.

lock if turned one quarter revolution, a key holding them in place. The coupler is made for 1 in., ¾ in., ½ in. and ⅜ in. hose and pipe with the same size head so that small hose can be coupled to large without the use of reducers.

PIPE TO PIPE CONNECTIONS.

The coupler is made of non-corrodible, white metal and the claim is, therefore, made that is it not affected by the weather or moisture. As indicated by the illustration couplings are made in hose to hose or pipe to hose with screwed end connections.

THE ALLIS-CHALMERS STEAM TURBINE.

The recent starting up of a steam turbine at the Washington Street power house of the Utica Gas & Electric Co., Utica, N. Y., calls attention to the fact that this is the first turbine to be put into operation by the Allis-Chalmers Co., which recently entered the steam turbine field. The turbine outfit installed at Utica is shown by the accompanying Figure 1.

This turbine is rated at 1500 K. W. normal load, and runs at a speed of 1800 revolutions per minute. It is direct coupled to an Allis-Chalmers 2-phase, 60-cycle revolving field alternator, operating at 2500 volts. The unit has a continuous overload capacity of 25 per cent, with a 3-hour 50 percent overload capacity without exceeding a safe generator temperature, and capable of a 100 per cent safe momentary overload. Artificial ventilation by means of an electrically driven fan blower will, however, enable the unit to be run safely beyond its rated overload capacity.

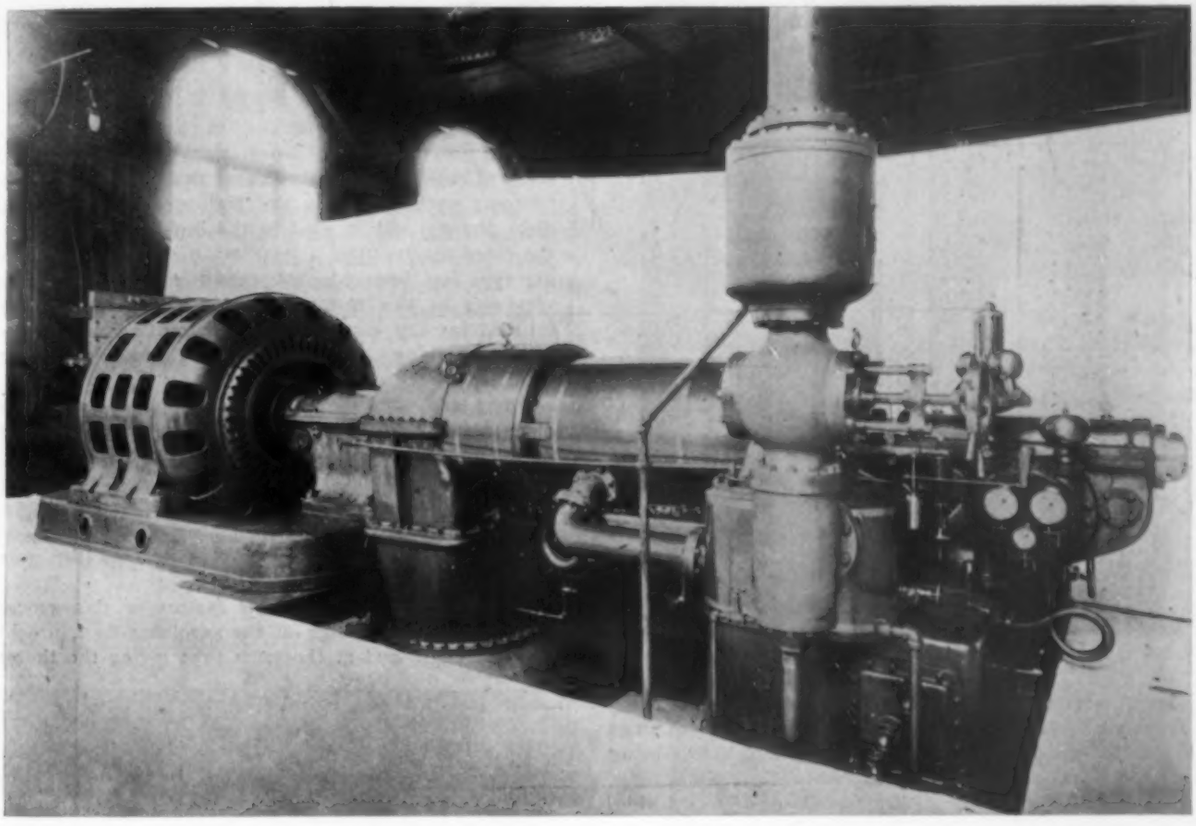


FIG. 1. ALLIS-CHALMERS TURBINE AT UTICA, N. Y.

The turbine follows the well-known Parsons type which has proven itself eminently successful in numerous installations both here and abroad. The Allis-Chalmers construction, however, embodies a number of features which are new in this country, and which are claimed by the builders to be distinct improvements.

The chief distinguishing feature of this construction is the blading, which, while it is of the Parsons reaction type as regards the principle of operation, differs in mechanical construction in a number of essential details.

The roots of the blades are formed in dovetail shape by special machinery, and are inserted in slots cut in foundation or base rings; these slots being formed by special machine tools in such a way as to exactly conform to the shapes of the blade roots. The foundation rings themselves are of dovetail shape in cross section and are inserted in dovetailed grooves cut in the turbine cylinder and spindle respectively, in which they are firmly held by key pieces, much in the same way that the well known "Lewis bolt" is fastened. In order to further ensure the integrity of the construction, the key pieces or rings after being driven into place are upset into undercut grooves.

Another noticeable feature of the blading is the method of reinforcing and protecting the tips of the blades. This point in steam turbine design is one upon which much thought has been expended by various inventors, and the Allis-Chalmers Co. claims that the construction employed by it successfully solves all difficulties. In forming the blades a shouldered projection is left at the tip. This is inserted in a slot punched in a shroud ring; the slots being punched by special machinery in such a way as to produce accurate spacing and at the same time form the slots so that they will give the proper angles to the blades independent of the slots in the base ring. After the blade tips are inserted in the slots in the shroud rings they are riveted over by specially arranged pneumatic machinery.

The shroud rings are made in channel shape, with outwardly projecting flanges which, after assembly in the turbine, are turned and bored to give the necessary working clearance. The flanges of the channels are made so thin that, although amply sufficient for stiffness, the shroud ring does not have the disadvantage of a solid shroud which acquires a dangerous temperature by friction in case of an accidental contact of the rotating and stationary parts. It is claimed for this construction that the blades are stiffened against the effect of vibration in a much more substantial manner than by any other means thus far employed, while the use of a protecting shroud ring enables the working clearance to be made smaller than in the case of naked blade tips, without danger in case of accidental contact, thus reducing the leakage loss to a minimum; the leakage past the blade tips being the

principal source of loss in the steam turbine. As to the safety from damage in case of accidental contact, it is claimed that this has been proven by experiment with actual blading, by throwing the bearings out of center so as to produce contact, without detrimental results. An incidental advantage claimed for this construction is that if by chance a blade should prove defective, it is so held in place by the shroud ring that it cannot possibly work loose and produce damage.

By the method of construction described, the entire blading is produced by machinery, thus eliminating the personal equation which enters into blading done by hand work, which depends upon the skill of the individual workmen. Besides ensuring that every blade is securely fastened, all blades are necessarily set at exactly the designed angle and pitch; the openings between blades, upon which

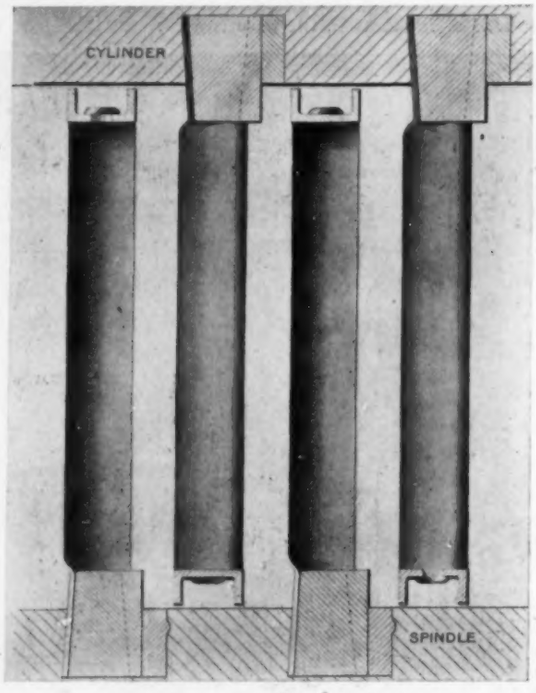


FIG. 2. METHOD OF FASTENING BLADE.

in great part the economical performance depends, being absolutely uniform. The blading is made up in half rings in the blading shop and is carefully inspected before being inserted in the turbine.

Figure 2, which was photographed from a drawing, shows the general scheme of the blading, illustrating the method of fastening the blades as well as the channel shaped shroud ring. Figure 3 shows two half rings of blades ready for assembly in a turbine; these half rings being respectively the smallest and largest ones, used in a turbine of the size installed at Utica. Figure 4 is from a photograph of blading, showing the substantiability of the construction as well as the uniformity of the work. Figure 5 shows a turbine spindle of the same size as that of the Utica turbine; this photograph having been taken in the West Allis shops of the Allis-Chalmers Co.

Another special feature of this turbine will be noticed by referring to Figure 5, viz., the absence of the usual low-pressure "balance piston"; the photograph showing only two balance pistons instead of the three pistons formerly used in this type of turbine, where it is said to have been found difficult to produce a balance piston of the size required for balancing the low-pressure stage of the turbine and at the same time make it sufficiently rigid to run with the necessary small working clearance. In the Allis-Chalmers construction there is, however, a third balance piston, but instead of being at the high pressure end of the turbine, as formerly arranged, it is at the low pressure end, and as it is smaller than the large end of the spindle, it is hidden from sight in the photograph. By making this piston in such a way that its circular area is equal to the

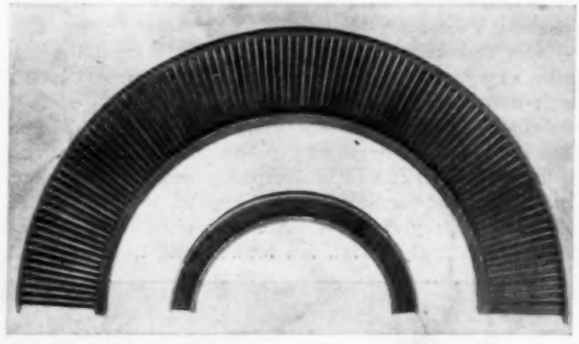


FIG. 3 ARRANGEMENT OF BLADES.

annular area of the pistons used in the older construction, the low pressure balance piston is made much smaller. Instead of reducing the leakage past this piston by means of "dummy packing", as in the high-pressure and intermediate pistons, and as used in the low-pressure pistons of the older construction, a labyrinth packing of radial baffling type has been adopted, thus eliminating small axial clearance in this turbine. A considerable advantage is claimed for this construction in permitting of the use of smaller working clearances in the high-pressure and intermediate balance pistons.

There are a number of other points of improvement claimed for this construction in the permitting of the use of permit of description within the space of the present article. These include details of spindle construction, governing mechanism, lubrication, and other minor features.

The alternating current generator of the Utica outfit also is deserving of more description than the present article will allow.

Perhaps the most noticeable feature of this generator is the substantial design of the revolving field, providing great strength and at the same time giving the thorough

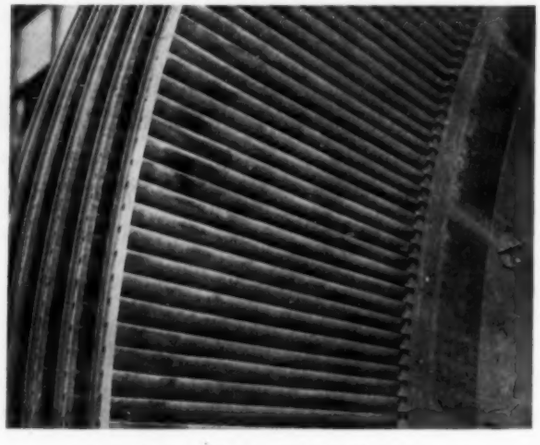


FIG. 4. CLOSER VIEW OF BLADING.

ventilation which is essential. Particular attention has been paid to the insulation, as may be inferred from the fact that the armature (Fig. 6) was subjected to an alternating current insulation test of 10,000 volts for the period of fifteen minutes. This generator was built at the

Bullock Works of the Allis-Chalmers Co. at Cincinnati, where the generators for all of its other turbine outfits are being built.

The Allis-Chalmers Co., in entering the steam turbine field, effected an alliance with the Turbine Advisory Syndicate of England, thereby securing the co-operation of the firms therein interested, including Messrs. Willans & Robinson, the famous high speed engine builders, of Rugby; Yarrow & Company, the well known torpedo boat builders, of the Isle of Dogs, London; and the Neptune Shipbuilding Works, Walker-on-Tyne. The Utica turbine, in fact, was built for the Allis-Chalmers Co. by Mçssrs. Willans & Robinson, to whom a number of other turbine

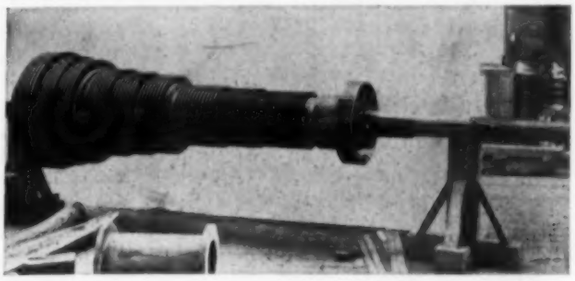


FIG. 5. TURBINE SPINDLE.

contracts were sub-let by the company before the latter had perfected the installation of its special machinery for turbine manufacture. An agreement has more recently been effected with Hon. Charles A. Parsons, C. B., for interchange of data, thereby giving to the Allis-Chalmers Co. the benefit of the vast experience of Mr. Parsons, the original inventor of this type of turbine, and to whose engineering ability and indomitable energy the evolution and present state of perfection of the successful steam turbine are principally due. Rights have also been secured under Mr. Parsons' patents for marine turbines and turbo-compressors and blowers, for which there is a growing demand.

At present the Allis-Chalmers Co. is building its steam turbines in its engine works at West Allis. The growth of the business, however, had led to a large exten-

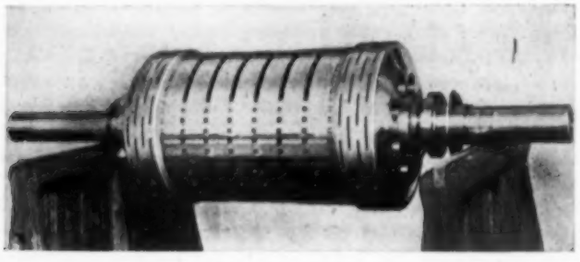


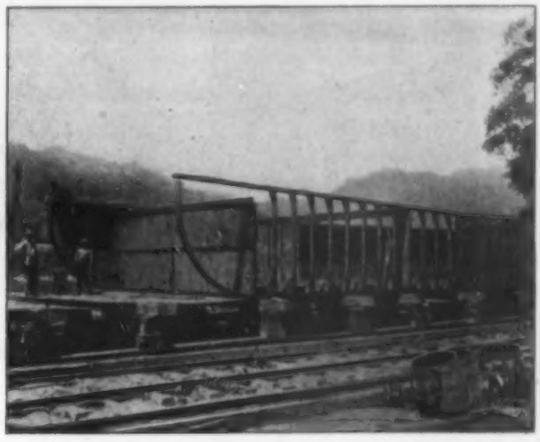
FIG. 6. ARMATURE.

sion of the works, amounting to a practical doubling of the present plant. A considerable part of the extension will be devoted to the manufacture of steam turbines and the accompanying electric generators; one of the three new manufacturing buildings being given up to the exclusive manufacture of the turbines themselves. The first steam turbine of the above company's own make, of 5,500 K. W. capacity, has recently been shipped, and others are following as fast as the present crowded condition of the shops will permit.

David C. Moulton, Providence, R. I., died Nov. 26 at the age of 74 years. He had been superintendent of engineering and construction for the General Fire Extinguisher Co. up to the time of his retirement in 1900.

STEEL BARGES ON THE OHIO RIVER.

The steel barge on the Ohio river and connecting tributaries is rapidly winning its way into popular favor. Although it was not until quite recently that adequate facilities for their building were provided and the number in use at the present time is, therefore, necessarily small, results shown from actual experience have so far convinced the leading transportation companies on the river of their practicability, utility and economy that conservative men in the business are predicting the gradual



END BULKHEAD AND SIDE FRAMES.

abandonment of the wooden boats and barges in favor of the modern steel hulls.

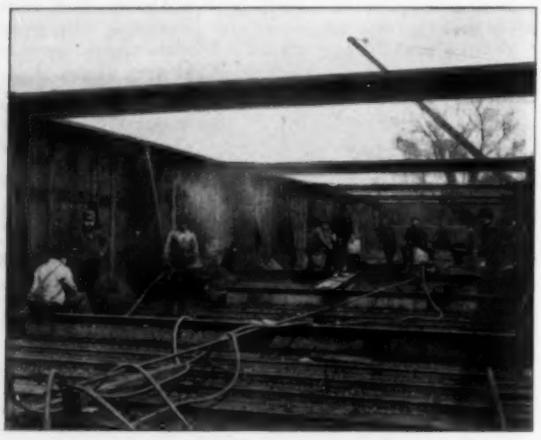
The average life of a wooden barge is estimated at 10 years and of a steel barge at 25 years. The cost of the wooden barge is about 40 percent of the steel barge. For repairs, interest on investment and the annuity required to replace the investment the annual cost of the steel barge is less than that of the wooden barge. Upon the

SHOWING RAKE AND BULKHEAD CONSTRUCTION.

relative cost alone owners have figured that they are justified in substituting the steel barges as fast as the wooden conveyances now in service wear out or are lost. This is emphasized by the increasng scarcity of timber. The steel barge, it has also been discovered, is not subject to damage by exposure to the sun and atmosphere, a characteristic of the wooden barge which furnishes a considerable item of expense, especially when low water delays the empties for weeks or months at a time. The steel barge is also liable to little damage by the ice; in

fact, practically the only charge for its maintenance is that of painting once a year.

The success of the steel barge in the harbor trade at Pittsburg was unquestionable. The American Bridge Co., at its plant at Ambridge, Pa., 16 miles below Pittsburg on the Ohio river, has attracted widespread attention by the construction of a fleet of steel barges for the American Steel & Wire Co. They have proven stronger than the wooden barge, better able to withstand the hard usages



INTERIOR VIEW OF A LONG BARGE.

to which they must of necessity be subjected, carried about 20 percent more cargo than the wooden boat on the same draft of water and permitted of better dispatch in the handling of the cargo as less care is necessary in their loading. These barges are each 100 ft. long, 24 ft. wide and eight ft. deep with 15 inches sheer at each end. They are constructed of alternate channel and angle frames four feet apart with a plank floor laid on the

INTERIOR LENGTH OF LONG BOAT.

channel frames. The steel plate used is from ¼ to ⅜ in. in thickness and the cross framing or ribs consists of channels and angles, fitted alternately except the side frames, which are angles. A steel water tight bulkhead is fitted at each end of the cargo space which prevents the boat filling in case of collision, and a steel handling deck is arranged over the bulkhead compartment.

The American Bridge Co. has also constructed three steel sand barges for the New Union Sand Co., of St. Louis, and the hull of a new packet boat for the Mississippi & Arkansas River Packet Co. is under course of construction. A steel hull fitted out with special machinery for handling coal is now in service at New Orleans, fueling ocean going vessels, and dredge hulls for river and

SAND BARGE FOR NEW UNION SAND CO. ST. LOUIS.

coast work have proved so successful that a number are now being constructed for use at the Panama Canal.

MILWAUKEE COMPANIES IMPROVING.

(Special Correspondence.)

Milwaukee, Wis., Dec. 11.—A number of Milwaukee machinery companies have in the past year become involved in financial difficulties, but in every instance they are recuperating, and in at least two cases, that of the National Electric Co., which became involved by the defalcation of banker F. G. Bigelow, and that of the William Baylay & Sons Co., the trustees report to the bankruptcy court that the institutions in their charge are making money.

H. F., E. C. and J. E. Baylay, formerly with the William Baylay & Sons Co., have incorporated the structural iron department of the old company under the name of the Baylay Structural Iron Co., with a capital of $75,000. A new plant will be built. Another company is now in process of formation to handle the old plant with a blower manufacturing business. The William Baylay & Sons Co. failed for $300,860, of which $250,652 were secured claims. Its real estate alone is worth $122,500.

The Milwaukee Electric Co., which has a model plant in West Allis, the site of the plant of the Allis-Chalmers' Co., and which has for the past year been winding up its affairs, has filed a demurrer to the petition of creditors requesting that the company be adjudged bankrupt. The officers deny that the company is insolvent or has committed an act of bankrupcy, and that they conveyed certain property to certain creditors with the purpose of defrauding others. There have been several offers to buy the plant, one being for $75,000, by a pressed steel tank company.

The Struthers Furnace Co., with offices at Cleveland, has blown in its stack at Struthers, O., which was the scene a few weeks ago of an accident that compelled the closing of the furnace for repairs. This work was rushed through and completed in record time. The cement department, which closed with the furnace, will not be started in the near future, as it is being overhauled and repaired.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

IMPORTANT DISCUSSIONS AT THE NEW YORK MEETING

Wide Differences of Opinion as to Safety of Elevators—Much Attention to Bearings—Engineers as Pupils at the Auto School.

The fifty-second meeting of the American Society of Mechanical Engineers was held in New York city from Dec. 5-8 inclusive. In point of attendance it was the most successful meeting ever held. The number of persons registered at the close of the last session was 1330, of which number 700 were members. No previous meeting reached the thousand mark, and the largest previous number of members registered was 542.

The headquarters of the society during the meeting were on the two top floors of the Edison Building, 44 West Twenty-seventh street. These quarters were admirably suited for the purpose, the upper floor being an auditorium which seated 500, while the lower floor was used as an office, and gathering place for the members. The society house at 12 West Thirty-first street, had proven, in the past few years, entirely inadequate for the purpose of meetings, and the commodious quarters available at this meeting were appreciated by all present.

TUESDAY EVENING SESSION.

The first session of the meeting was called to order at 8:30 Tuesday evening, and after the usual preliminaries president Freeman gave his presidential address entitled, "The Safeguarding of Life in Theatres; A Study from the Standpoint of the Engineer". This dealt with a number of recent theatre fires, the conditions that exist in theatres, the fire protection systems in use in them, their deficiences and remedies. Mr. Freeman brought out the startling fact that fire protection in theatres is 20 years behind that in factories, and that devices are still in use in theatres that have been discarded in other places.

At the conclusion of the address, the members adjourned to the floor below, where a social hour was spent, and refeshments served.

WEDNESDAY'S SESSIONS.

The Wednesday morning session was held in Hoboken on board the steamship "Amerika" of the Hamburg-American line. The meeting was called to order by president Freeman, in the main saloon of the vessel. Mr. Emil Boas, general manager of the Hamburg-American line, welcomed the engineers in a brief address, in which he recounted the growth of the line since its inception 57 years ago, when its only ship was a small sailing vessel. It now operates 149 steamships on a large number of different services.

After Mr. Boas' address the newly elected officers of the society were announced as follows:

President, Fred. W. Taylor, Philadelphia; vice-presidents, Walter N. McFarland, Pittsburg; Edward N. Trump, Syracuse; Robert D. McKinney, New York; Managers, Walter Laidlaw, Cincinnati, Fred. M. Prescott, Milwaukee, and Frank G. Tallman, Cleveland.

Mr. C. W. Hunt was called upon to report as to the progress of the new Engineering building. He stated that before the first of January it is expected that the stone work will have risen to a height of 50 feet and the steel work to a height of 150 feet.

The president requested Mr. Hunt and Mr. S. T. Wellman to conduct the president-elect to the chair and present him to the society. Mr. Taylor made a brief address in which he thanked the society for the honor conferred upon him. The session proceeded and the report of the committee on "Standard Proportions for Machine Screws" was presented by Mr. George M. Bond. The report was in printed form and dealt with the form of thread, diameters, the number of threads per inch, standard reference thread gauges, working gauges, limits of variation in screw and tap diameters, limits of variation in screw and tap pitches, and standard proportions for screw heads. The report provoked considerable discussion. Mr. E. H. Neff requested the postponement of the formal discussion of the paper until the next meeting. He criticised the findings recommended by the committee in regard to the method of calibrating screw threads by means of a micrometer caliper with spherical contacts, pointing out various inaccuracies which would result from the use of such a method. He also criticised the tables presented for the diameters of screws, stating that diameters as determined by the formulae submitted disagreed with any sheet metal or wire gauge, and that the measurements were altogether too refined, being carried out to six decimal places of an inch.

Mr. Burlingame, in speaking of the flattening of the top of the threads stated that it was the practice of the Brown & Sharpe Mfg. Co., to depart from the Sellers standard, in which the thread is flattened ⅛ of the pitch, by flattening the smaller sizes about 1-12 and the larger ones, 1-6 of the pitch. He objected to the committee's method of measuring diameters, and stated that there were other and better ways of doing so. He approved the pitches recommended for the various diameters, but stated that the report did not go far enough. It should be made to cover the larger sizes in which the U. S. standard pitch was not fine enough. He did not approve the dimensions of heads as recommended by the committee, and stated that a fillister head screw, which was flat on top, with rounded corners had proven more satisfactory than the style adopted by the committee.

The society then voted to continue the committee and the discussion was closed with remarks by Mr. Collosa Mr. E. O. Goss, and Mr. Geo. M. Bond.

Mr. Jay M. Whitham's paper on the "Use of Natural Gas under Steam Boilers," was next presented. This paper will be published in an early issue of The Iron Trade Review.

Some Lively Discussion.

Mr. Whitham's paper was the subject of some lively discussion. Mr. E. G. Bailey presented the results of two boiler tests which he had made with gas as fuel, and in which he had obtained very good results. Mr. E. A. Hitchcock gave the results of four boiler tests made by him. He stated that he found gas to be more efficient than coal. Mr. J. Roland Brown made some minor corrections in the tests made by him as reported in Mr. Whitham's paper. He stated that with a properly fired gas furnace an efficiency of 70 percent should be obtained from the boiler. There should, however, be no large excess of air, but a proper proportion to effect perfect combustion. In his opinion the blue flame was more efficient than the white one, thus differing from the author, who held that one was as good as the other. Mr. Brown stated that the blue flame was often mistaken for a white one, owing to the incandescent state of the interior of the

furnace, which concealed the true color of the flame. Mr. Goss gave his experience with gas and coal stoves and stated that he found gas more efficient than coal.

The Largest Vessel in the World.

During the discussion of the papers, the members of the society and their guests were taken through the vessel in parties of 35, and allowed to inspect it from stem to stern. As the Amerika is the largest vessel in the world, and was on only her second trip, she was examined with considerable interest.

After the business of the morning had been concluded the members proceeded to the Lackawanna Railroad station, where a special train had been placed at their disposal to convey them to the new plant of the International Pump Co. at Harrison, N. J. About 1,300 persons made the trip returning about 5 o'clock after having spent four hours there.

WEDNESDAY EVENING'S SESSION.

Wednesday evening's session comprised a lecture by Prof. R. W. Wood on "The Photography of Invisible Phenomena", which was delivered in the auditorium at 44 West 27th Street. The lecture was illustrated by means of lantern slides and proved very interesting. Among other things Prof. Wood described the method of taking what he called "fish eye" photographs, which gave a view of 360° around the horizon, the plate being placed horizontal. After the lecture, which was largely attended by the ladies, a conversazione was held on the floor below.

THURSDAY MORNING'S SESSION.

There were no new subjects on the schedule for the session held on Thursday morning, the time being devoted to a topical discussion of matters presented to the assembly at previous sittings. The "General Discussion on Bearings" brought out among others the following observations.

George R. Henderson spoke of the device often resorted to in locomotive practice of increasing the length of the bearing by extending the inner side, a practice which reduces the average unit pressure but imposes an eccentric load on the journal. He considered it generally preferable to get along with an increased unit pressure than to create an eccentric loading.

Prof. R. C. Carpenter referred to the need of a method of making a laboratory test of bearing metals, calling attention to the shortcomings of the apparatus and schemes in use. A number of improvements were proposed and in conclusion the speaker said: "In my opinion there is no positive criterion, no single definition or specification, which can adequately describe a bearing metal which shall be universally satisfactory for all work and conditions."

Albert Kingsbury described a series of tests of large shaft bearings made in 1904 by the Westinghouse Electric & Manufacturing Co. at the East Pittsburg works. The experiments were undertaken at the request of the Niagara Falls Hydraulic Power & Manufacturing Co. and the special apparatus required was made for that concern. Detailed data of the conditions and results of the tests were given in a table. It was found possible to run the bearings with loads and speeds greatly exceeding the ordinary values in practice, even without water-cooling the bearing sleeve. The table showed that the power required to drive the shaft was very nearly proportional to the speed of rotation, independent of all other conditions such as load, final temperature attained and lubricant used. This result was not given as a general law but pointed out as noteworthy even as an accidental relation.

Water Better than Oil.

C. W. Naylor gave an interesting account of the successful use of water as a lubricant for bearings in the engine room of a large commercial establishment in Chicago. For two years much trouble has been experienced in keeping the boxes in question cool with oil, of which several different grades were used as well as greases. Lake Michigan hydrant water was then tried with such good results that it was continued for a period of eleven years, without any serious interruption for ten hours each week day. A small stream of water was allowed to trickle through the bearings and at five minutes before closing down oil was fed to prevent rusting when the machinery rested idle. The increase in temperature of the shafting was inappreciable and less trouble was experienced on that score with eleven years' use of water than with one month's use of oil.

Discussion Presented.

In addition to the printed discussions, written discussions were submitted by a number of members. Mr. George W. Dickie presented one on bearings used in marine practice and laid stress on the changes which would occur upon the substitution of turbines for reciprocating engines. Mr. J. J. White presented a short discussion in which he showed a special bearing designed for use on wood-working machinery. Mr. George M. Bassford discussed the subject of locomotive bearings. He stated that in the design of locomotive bearings it was of little use to study the coefficient of friction. The areas used were determined chiefly by the possibilities of lubrication, which were influenced by the conditions under which the bearing operated, such as fluctuating loads, pressures, grit, temperature changes, etc. Experience shows that crank pins on locomotives may be loaded to from 1500 to 1700 lb. per square inch, lubrication in this case being comparatively easy. Wrist pins may be loaded to 4,000 lb. per square inch. The load which may be placed on journal bearings varies with the class of service of the locomotive; from 190 lb. for passenger service to 220 lb. for switching engines. The limitations imposed on tender and car journals are: First, Fibre stress must not be too high; second, There should be sufficient bearing area to insure cool running. The loads permissible vary from 300 to 325 lb. per square inch.

Mr. P. H. Been, Milwaukee, cited the bearing practice on large Corliss engines. All bearings are lined with high grade babbitt metal covering the entire core of the shells. The babbitt is held in place by dovetailed grooves cored in the shells. Oil boxes are but little used for lubrication at the present time, pressure oil cups having replaced them. In regard to the cooling of the bearings—the standard construction now used provides no special method of cooling. In extraordinary cases the shell is cored so that water can be circulated, though it is usually found unnecessary. In regard to the limits of speed and pressures, the greatest pressure allowed is 140 lb. per square inch of projected area, the speeds being allowed to run between 75 and 150 revolutions per minute. In calculating these pressures the weights considered are the dead weights only, such as engine and generator parts, the load due to steam pressure not being taken into account. The bearings for horizontal engines, running at high speeds and under high pressures are designed in four parts, a bottom, two sides and top shell, the cap being independent of the shell. The side away from the cylinder is adjusted by set screws, the other side by shims. Bearings for vertical engines are made in two parts, upper and lower. The lower part is of ball and socket construction allowing the bearing to rock with deflections of the shaft. The upper part of the bearing is made solid with the cap and no provision is made for wear.

Other Roller Bearings.

Mr. Frank Mossberg described the roller bearings made by the Standard Machinery Co. of Providence. These are in two types, one of the cylindrical form and one of the radial type for thrust bearings. He assumed that the bearings, form line contact only and that therefore a small roller would carry as heavy a load as a large one. He presented a table which had been developed, based on speeds ranging from 0 to 25 ft. per minute and with the length of journal 1½ times the diameter. This table showed that no less than 20 rollers were used in each case. The rollers were made of tool steel not too high in carbon and of rather low temper, a spring temper being considered best. The shafts and journals should have a medium spring temper to give the best results. The box should be made of high carbon steel and as hard as possible. The thrust bearings used rollers slightly conical in shape placed radially around the axis of the shaft. The apex of the cones terminate at the axis of the shaft and the surface angle is about six degrees. The coefficient of friction was found to be about 0.002 with the cylindrical type of bearing and 0.0025 with the thrust type.

Mr. Samuel Eveland stated that the finish of ball and roller bearings is of the highest importance. He gave as an example the case of a lighthouse lens, seven feet in diameter and weighing 3000 lbs., on which tests were made with different types of bearings. The bearings were as follows: 1.—A government designed bearing finished true to from 0.001 to 0.002 inch fitted with ordinary balls bought in the open market. 2.—A bearing designed by a manufacturer, true both in respect to plates and balls to 0.0001 inch. 3.—A plain slide bearing. 4.—A bearing consisting of the manufacturer's specially finished plates and ordinary commercial balls. The weight required to revolve the lens under the condition (1) one revolution in 25 seconds, was 123 lb. Under condition (2) one revolution in 13 seconds, 63 lb. Under condition (3) one revolution in 30 seconds, 900 lb. Under condition (4) one revolution in 20 seconds, 73 lb. Another test showing the pressure required at the rim to move the lens was under condition (1) 64 oz., under condition (2) ⅛ oz., under condition (4) three ounces. Mr. Mossberg stated that notwithstanding these types it was hard to convince the buyers of inaccurracies and cited a number of instances. In regard to the steel to be used it should be case hardened for plates, sleeves, cups and cones for both ball and roller bearings. Contrary to the usual belief, oil is necessary with both ball and roller bearings, as line and point contact is actually impossible, and rust would also occur in the bearing if it were not lubricated. In roller bearings the rolls should be made of steel hardened and ground, and should run on hardened and ground surfaces. Cast iron should not be used for a race for roller bearings, as the harder steel rolls would grind it to powder. If a soft steel should be used the rolls would condense the steel and cause the bearings to loosen. The saving in power due to the use of roller bearings depends on conditions, and also whether they are cleaned and oiled regularly and kept properly aligned. It has amounted to as much as 25 percent on automobiles. A test of army wagons was described, which showed a reduction in the pull, with roller bearings, amounting to 75 percent on asphalt and 55 percent on dirt roads. In another instance a drill press that had a capacity of a ⅝ inch diameter hole under ordinary conditions, drilled a 1¼ inch hole when fitted with a roller thrust bearing. The steam yacht "Aphrodite," 3,300 horsepower, showed an increase of speed of 8 percent, and a saving of seven tons of coal daily, when fitted with a roller propeller thrust bearing. A test made on the generators in the Niagara Falls power station was also given, and the superiority of the roller thrust bearings over the former style of cast iron bearings was shown. Mr. Ireland said it was impossible to make balls true to size, and that the crushing strength varied considerably; an ordinary ¼ inch ball having a crushing strength of 6,000 to 6,500 lb. while a ½-inch ball had a crushing strength of from 25,000 to 30,000 lb. The fact of a ball being able to sustain a given load was of little importance since speed entered into the question. As the speed varies with each size of ball and is very important, a ball which will carry a given load at one speed will crush at a higher one. The hardness also has an influence on the strength. A ball known as "glass hard" will stand less than 50 percent of the load that an ordinary tempered ball will carry and it will also crush instantly under moderate shock. The ordinary ¼-inch ball will crush at 6000 lb., the "glass-hard" at 1,500 to 2,000 lb. and a specially tempered ball at 10,000 to 12,000 lb., but this crushing strength has no bearing on the actual commercial load.

Experiments Illustrated.

Mr. W. S. Rogers illustrated on the blackboard some experiments which had been made on journal and roller bearings twenty-five years ago and which he had recently repeated. These experiments tended to show that the friction of the roller bearing was less at low and greater at high speeds than the other type. He disapproved of the roller bearing as at present made, and in regard to ball bearings stated that a one inch ball should not carry over 1000 lb. and a ½-inch ball not over 200 lb.

Mr. H. B. Jones submitted the results of his experience with bearings in the Russell & Erwin Mfg. Co. There is 3,000 ft. of self-oiled shafting of 2 7-16 in. average diameter running at speed ranging from 150 to 500 revolutions per minute. All bearings are fitted with a suction oiler in the center, and some of the bearings were fitted with ring oilers at the ends. The bearings fitted with suction oilers ran equally as well as those fitted with ring oilers. Several grades of oil were used, and the horsepower required to drive the shafting varied with the quality of the oil. With a "black oil" so called, 567 horsepower was required on May 11, 1905. On May 16 the black oil was drawn off and an "engine oil" substituted. The horsepower required immediately decreased to 487 and continued to diminish until June 15 when it was 428, a saving of 24½ percent. A suction oiler which had been in use for 29 years and 10 months was exhibited.

Mr. Henry Hess gave some examples of German practice, and gave a summary of the investigations of Stribeck, which were to determine the relation between the specific load and the coefficient of friction. He presented a number of formulae for different types of bearings. With roller bearings the coefficient of friction at rest was lower than the coefficient of friction in motion. With ball bearings it was the same both in motion and at rest. Experiments by Riebe demonstrated that a single row of balls, with two point contact on straight line sections to be the best type of ball bearing. Two-point contact is superior to three or four point, as the latter give higher frictional resistances, due to sliding friction and to the presence of grit having more effect on a three point bearing.

Mr. Oberlin Smith stated that there was no such thing as line contact with roller bearings, but that there was always surface contact. In regard to high bearing pressure, he gave as an example a toggle press in which the load on the toggles was 20,000 lb. per in.; on the eccentric running in cast iron bearings, 7000 lb.; on journals of the

press, 3500 lb. The loose wheel of the press had a bearing pressure of only about 50 lb. per square inch, but was continually giving trouble due to its being in line contact. The speed in the bearings was about 100 ft. per minute.

Mr. F. W. Taylor stated that with babbitt bearings, with ring or chain oil feed, the highest allowable pressure should not be over 10 lb. per square inch, with a velocity of 10 ft. per second.

G. H. Reist gave us the practice of the General Electric Co. in regard to bearing repssure, a variation of from 20 to 80 lb. per square inch, 40 lb. being the usual figure. The rubbing speed varies from 1,200 to 400 feet per minute. The ratio of length to diameter of bearings is as three to one. Ring oilers were used on large bearings, spaced eight inches apart, and a pressure system of oil circulation was advised. He then described the thrust bearing used in the Curtis turbine, in which the rotating part is carried on a film of oil under pressure.

This closed the discussion, and the president remarked that the topic had proved so fruitful that it would be wise to repeat it at the next meeting.

Reinforced Concrete.

Mr. E. N. Hunting then presented his paper on "Reinforced Concrete in Machine Shop Construction," which will appear in a later issue of *The Iron Trade Review.*

It was discussed by Messrs. Geo. Hill, Scheffler, Turner, Williston, R. C. Carpenter and Taylor. The discussion bore mainly on the cost of this type of construction, there being considerable difference of opinion in this respect.

The Automobile School.

On Thursday afternoon about one hundred members of the association visited the lecture and demonstration rooms of the New York School of Automobile Engineers, at 146 West 56th St. Prof. Charles E. Lucke and his corps of six instructors explained to the visitors the various departments, the apparatus and the method of instruction. No formal meeting was held, the members wandering at will about the laboratories and lecture rooms of the building.

The Annual Reception.

The annual reception was held at Sherrys on Thursday night, the receiving party consisting of president and Mrs. Freeman, president-elect and Mrs. Taylor, secretary Hutton. About 1,000 persons were in attendance and dancing was engaged in to an early hour in the morning.

FRIDAY SESSION.

The Friday morning session, which was the final one, was called to order promptly at ten o'clock. Mr. R. J. Durley's paper on the "Measurement of Air Flowing Through Thin Orifices," was first presented. It was discussed by Messrs. Supplee, Turner, and Snow, the discussion being mainly on the formula and coefficients developed. Following this, R. H. Firnal's paper on the producer gas tests at the St. Louis Exposition was read in abstract by the author. It was discussed by Mr. F. E. Junge, a member of the German society of engineers, who gave the practice in regard to producer gas on the Continent. Prof. Parker, who was in charge of the fuel testing plant, made some corrections as to the calorific value of the gas, as given in the paper, and detailed the difficulties encountered in making the tests.

Mr. A. A. Cary followed Mr. Parker, and said that producer testing is really furnace testing extended and refined. There is a field for the producer in furnace work, and he predicted a large use for it in that work. He described a producer used for making air and water gas alternately, of low and high calorific value respectively and said that the two, when mixed, made a gas of fair value. He then expressed a hope that a good mixer would be developed for these two gases, as the efficiency of the present types of mixers was low.

Mr. S. S. Wyer said that the tests conducted at St. Louis showed the need of a fixed code for the conduct of producer tests. Tests by different investigations could then be compared. He recommended the adoption of a code by the society, similar to its code for steam boiler tests. Mr. Fernald in reply said that the paper had been written in order that suggestions could be made as to the proper methods to be used in future work, and the best form of log sheets could be determined.

It was then moved and carried that a committee be appointed to formulate a code for the conduct of producer tests.

Mr. Charles E. Lucke's paper on "Pressure Drop through Poppet Valves" was then read and was discussed by Messrs. Morse and Hill. The paper detailed investigations made to determine the best form of valve for gasoline and gas engines, and was incomplete in that the conclusions to be deduced from the investigation were not in the paper. These are to be drawn and incorporated in the paper when it is printed in the transactions of the society.

Bitter Discussion of Elevators.

Mr. A. J. Herschman then read his paper detailing the results of tests on the plunger elevators in the Trinity building, New York. The discussion on this paper was most sharp. Mr. R. P. Bolton attacked the paper bitterly, both as to the method of testing, the results, and the reading and illustrative matter in the paper.

He also criticised the plunger type of elevator as unsafe. A number of members, including president Freeman, took issue with him on this point, and numerous instances were cited to show that accidents to plunger elevators, when they did occur, were not as one not as one might be lead to believe. Written discussions also were submitted by Messrs. Matthews, W. H. Bryan, T. E. Brown and C. R. Platt.

Ideals in Industrial Engineering.

Mr. H. T. J. Porter then presented his paper on "The Realization of Ideals in Industrial Engineering". This deals with the improvement of conditions for the comfort and safety of workers in factories, and was illustrated by lantern slides, showing what has been accomplished in various places. This paper will appear in *The Iron Trade Review* in the near future.

The paper said in part:

"From the shop owner's standpoint the ideals to be realized in industrial engineering are:—

"First.—The producing of a marketable product which will command the highest price of any similar product in its class.

"Second.—The producing of the greatest possible quantity of this article at the lowest possible cost.

"There are several phases of the human side of the shop that are strictly engineering problems. These are employees' efficiency, records enabling the manager to encourage and keep the best workers and weed out the poor ones. Such records would reveal which men should be given a chance to do better work and also which men in the shop are more capable as acting as instructors to the poorer workmen. The great majority of men who have fallen below the standard of good performance will make a success of their tasks when properly instructed. The second phase of the human side of the shop which should be handled by the engineer is the apprenticeship system. The all around machinist is almost extinct; that is, the man who knows how to run practically all the different types of tools in the shop. The education of the men is usually deficient and there is a great need for the estab-

lishment of real trade schools, with the best obtainable, really practical instructors, for the working people. This is the proper field for 'welfare' and 'betterment' work."

Betterment Work at Ilion, N. Y.

Mr. John Calder, in discussing the paper told of the betterment work which Messrs. Wyckoff, Seaman & Benedict had done at the Remington typewriter factory, Ilion, N. Y. The chief rewards are the badge and bonus, suggestion and first aid schemes. Badges are given to employees in good standing who have maintained unbroken connection with the company for periods of over ten years, different badges being given for different lengths of service.

Mr. J. T. Hawkins also presented a written discussion which dealt with the problem of bettement work as related to the trade unions. This discussion will be given in full in conjunction with Mr. Porter's paper.

Adjournment.

This concluded the business of the meeting, and after the new president Mr. Taylor, had taken the chair, it adjourned to meet in Chattanooga, Tenn, next spring.

CONDITION OF LONG IDLE FURNACES.

The Bulletin of the American Iron & Steel Association in its next issue will say:

As stated in the last issue of the *Bulletin* there were a large number of blast furnaces in this country which had not made pig iron from June 1, 1904, to Nov. 1, 1905. The annual capacity of these idle furnaces we then estimated at not less than 1,500,000 tons. We have since ascertained that 17 stacks, with an annual capacity of 601,500 tons, have resumed operations since Nov. 1 or are preparing to resume at an early day, and that 39 stacks, with an annual capacity of 1,197,600 tons, are not likely to resume work in the near future.

The blast furnaces which are now being built and which are to be ready for blast in January, February, March and April, 1906, as mentioned in detail in our last issue, will have an annual capacity of 915,000 tons. If to this capacity we add the 601,500 tons above mentioned we will have 1,516,500 tons of additional blast furnace capacity that will probably be available by the end of May, 1906. If to this capacity we add the 28,635,000 tons reported in our last issue for the whole country it will be found that within the next six months we will have an available capacity of at least 30,151,000 tons of pig iron. This capacity, making due allowance for furnaces necessarily idle, should be sufficient to supply all demands for pig iron in the period mentioned.

Furnaces Likely to Blow in Soon.

Below is a list of furnaces that have been idle from June, 1904, to Nov. 1, 1905, and which have since blown in or are soon to blow in.

Copake Iron Works, Copake Iron Co., lessee, Copake Iron Works P. O., New York. One charcoal stack, 53 x 9; product, pig iron for gun castings, gun carriages, car wheels, chilled rolls, and malleable castings; annual capacity, 5,000 tons.—Last active in December, 1903; will probably blow in in March or April, 1906.

Oxford Furnace, Empire Steel & Iron Co., Catasauqua, Pa. One anthracite coal stack at Oxford, N. J.; size, 63 x 17½; product, Bessemer, foundry, and forge pig iron; annual capacity, 36,000 tons.—Last active in 1903; will resume operations about Jan. 1.

Carbon Iron Works, Carbon Iron & Steel Co., Ltd., Mauch Chunk. One anthracite coal and coke stack at Parryville, Pa.; size, 66 by 15; product, "Carbon" foundry, "Parry" Bessemer, and "Viking" low-phosphorus pig iron; annual capacity, 38,000 tons.—Idle from the first half of 1904 to Nov. 27, 1905, when the furnace was blown in.

Sharpsville Furnace, Sharpsville Furnace Co., (not incorporated,) Sharpsville, Pa. One coke stack, 65 by 15; product, Bessemer, foundry, and red-short mill pig iron; annual capacity 72,000 tons.—Last active in November, 1903; may resume operations soon.

Covington Furnace, Low Moor Iron Co., of Virginia, Low Moor, Va. One coke stack at Covington, 75 by 18; product, foundry pig iron; annual capacity; 33,000 tons.—Last active in August, 1903; to blow in in January.

Graham Furnace, Walter Graham, lessee, Philadelphia. One coke stack at Graham, Va., 70 by 15; product, foundry and basic open-hearth pig iron; annual capacity, 50,000 tons.—Last active in March, 1904; may blow in in the spring of 1906.

West End Furnace, West End Furnace Co., 326 Chestnut street, Philadelphia. One coke stack at Roanoke, Vir., 82 by 17; product, foundry pig iron; annual capacity, 45,000 tons.—Idle from August, 1903, to Nov. 14, 1905, when furnace blew in.

Bear Spring Furnace, Dover Pig Iron Co., Bear Spring, Tenn. One charcoal stack, 47 by 9½; product, low-phosphorus pig iron; annual capacity 5,000 tons.—Last active in February, 1904; will probably blow in on April, 1906.

Cherokee Furnace, Alabama & Georgia Iron Co., New York. One charcoal stack at Cedartown, Ga., 60 by 14; product, carwheel pig iron; annual capacity, 20,000 tons.—Last active in May, 1904; will probably blow in in December, 1905.

Alice Furnace No. 2, Tennessee Coal, Iron, and Railroad Company, Birmingham, Ala. One coke stack, 75 by 18; product, basic and foundry pig iron; annual capacity, 60,000 tons.—Last active in November, 1903; will probably blow in on January 15, 1906.

Attalla Furnace, Eagle Iron Co., Chattanooga, Tenn. One charcoal stack at Attalla, Alabama, 55 by 11; product, car-wheel pig iron; annual capacity, 18,000 tons.—Last active in October, 1903; may blow in early in 1906.

Quinn Furnace, (formerly called Coosa Furnace,) Quinn Furnace Co., Gadsden, Alabama. One charcoal stack, 64 by 12; product, pig iron for car-wheel and foundry purposes; annual capacity, 20,000 tons.—Last active in June, 1903; will probably blow in in January.

Round Mountain Furnace, Round Mountain Iron and Wood Alcohol Co., Round Mountain, Ala. One charcoal stack, 45 by 9½; product, low-phosphorus and car-wheel pig iron; annual capacity, 6,500 tons.—Last active in May, 1904; will probably blow in in January.

Talladega Furnace, Northern Alabama Coal, Iron, and Railway Company, 25 Broad st., New York. One coke stack at Talladega, Alabama, 72 by 18; product, foundry and forge pig iron; annual capacity, 60,000 tons.—Last active in October, 1903; may blow in early in 1906.

Bird Furnace, (formerly called Lawrence Furnace,) Bird Iron Co., Ironton, Ohio. One coke stack at Culbertson, 65 by 14; product, foundry, forge, and malleable pig iron; annual capacity, 40,000 tons.—Last active in July, 1903; will probably blow in January 1, 1906.

Steubenville Furnace, Carnegie Steel Co., operators, Pittsburgh, Pa. Furnace at Steubenville, Ohio. One coke stack, 75 by 16; product, Bessemer pig iron; annual capacity, 72,000 tons.—Last active in October, 1903; to resume operations in December, 1905; will be operated by the Carnegie Steel Co. for the National Tube Co., owners.

Irondale Furnace, The Pacific Steel Co., M. J. Carrigan, Receiver, Seattle. One charcoal stack at Irondale, Washington, 50 by 10; product, foundry pig iron; annual capacity, 18,000 tons.—Last active in 1903; being overhauled; will probably resume operations in February, 1906.

Total number of furnaces, 17; total annual capacity, 601,500 tons of pig iron. Of the total 8 stacks, with an annual capacity of 435,000 tons, use coke for fuel; 7 stacks, with an annual capacity of 92,500 tons, use charcoal; One stack, with an annual capacity of 38,000 tons, uses anthracite coal and coke mixed; and one stack, with an annual capacity of 36,000 tons, uses anthracite coal alone.

Furnaces not Likely to Blow in Soon.

The following furnaces, which have been idle since June 1, 1904, are not likely to blow in soon. Some of them are idle for all time.

Cheshire Furnace, Cheshire, Mass. One charcoal stack, 32 by 9½; annual capacity, 4,500 tons.—Idle since 1893; for sale.

Breaker Island Furnaces, on Breaker Island, opposite Troy, New York. Three anthracite coal and coke stacks, each 80 by 18; annual capacity, 180,000 tons.—Last active in 1897.

Poughkeepsie Iron Co., Poughkeepsie, New York. Two anthracite coal and coke stacks, one, 60 by 15½, and the other, 70 by 16; annual capacity, 75,000 tons.—Last active in 1903.

Hackettstown Furnace, Hackettstown, New Jersey, one coke stack 60 by 15; annual capacity, 35,000 tons.—Last active in 1902.

Anvil Furnace, Pottstown, Pa. One anthracite coal and coke stack, 80 by 17; annual capacity 50,000 tons.—Last active in 1893.

Aurora Furnace, Wrightsville, Pa. One anthracite coal and coke stack, 65 by 14½; annual capacity, 30,000 tons.—Last active in 1903.

Isabella Furnace, Wyebrooke, Pa. One charcoal stack, 60 by 7¾; annual capacity, 5,400 tons.—Last active in 1894; in good condition.

Saxton Furnaces, Saxton, Pa. Two coke stacks: No. 1, 70 by 18, No. 2, 71 by 17; annual capacity, 90,000 tons.—One last active in 1903.

Standard Furnaces, Chickies, Pa. Two anthracite coal and coke stacks: No. 1, 65 by 14, No. 2, 66 by 14; annual capacity, 33,500 tons.—Last active in the last half of 1900.

Tidewater Furnace, Thurlow Station, Pa. One anthracite coal and coke stack, 70 by 17; annual capacity, 50,000 tons.—Last active in 1903.

Vesta Furnace, Vesta, Pa. One anthracite coal and coke stack, 65 by 14; annual capacity, 30,000 tons.—Last active in 1903.

Deborah Furnace, Catoctin Furnace, Md. One coke stack, 60 by 13; annual capacity, 15,000 tons.—Last active in 1903; to be sold in 1906.

Fosters Falls Furnace, Fosters Falls, Va. One charcoal stack, 34 by 10; annual capacity, 3,000 tons.—Last active in February, 1904.

Ivanhoe Furnace, Ivanhoe Furnace P. O., Va. One coke stack, 70 by 13 1-6; annual capacity, 20,000 tons.—Last active in December, 1903.

Radford Furnace, Radford Furnace P. O., Va. One coke stack, 36 by 10; annual capacity, 4,000 tons.—Last active in 1900.

Grand Rivers Furnaces, Grand Rivers, Ky. Two coke stacks, each 60 by 13½; annual capacity, 45,000 tons.—Last active in 1903.

Paducah Furnace, Paducah, Ky. One coke stack, 70 by 14; annual capacity, 30,000 tons.—Last active in 1903; for sale.

Aetna Furnace, Aetna, Tenn. One charcoal stack, 55 by 11; annual capacity, 18,000 tons.—Idle for many years; for sale.

Cherokee Furnace, Greensboro, North Carolina. One coke stack, 70 by 16½; annual capacity, 35,000.—Last active in October, 1903.

Alice Furnace No. 1, Birmingham, Ala. One coke stack, 75 by 15; annual capacity, 45,000 tons.—Last active in February, 1903.

Jenifer Furnace, Jenifer, Ala. One coke stack, 75 by 16; annual capacity, 50,000 tons.—Last active in November, 1903.

Lady Ensley Furnace, Sheffield, Ala. One coke stack, 75 by 17; annual capacity, 70,000 tons.—Last active in October, 1903.

Williamson Furnace, Birmingham, Ala. One coke stack, 65 by 14½; annual capacity, 30,000 tons.—Last active in September, 1903; recently repaired; time of blowing in indefinite.

Woodstock Furnaces, Anniston, Ala. Two coke stacks; No. 3, 82 by 20, and No. 4, 75 by 17; annual capacity, 160,000 tons.—No. 3 last active in May and No. 4 in December, 1903.

Jefferson Furnace, Jefferson, Texas. One charcoal stack, 60 by 12; annual capacity, 18,000 tons.—Last active in February, 1904.

Star and Crescent Furnace, near Rusk, Texas. One charcoal stack, 65 by 11; annual capacity, 25,000 tons.—Last active in May, 1899.

Tassie Belle Furnace, New Birmingham, Texas. One charcoal stack, 60 by 11; annual capacity, 15,000 tons.—Last active in February, 1892.

Bloom Furnace, Bloom Switch, Ohio. One charcoal stack, 35 by 10; annual capacity, 2,700 tons.—Last active in May, 1904.

Buckhorn Furnace, Olive Furnace P. O., Ohio. One charcoal stack, 38 by 10; annual capacity, 4,000 tons.—Idle since January, 1884.

Hecla Furnace, Ironton, Ohio. One charcoal stack, 52 by 10; annual capacity, 7,500 tons.—Last active in April, 1904.

Vesuvius Furnace, Ironton, Ohio. One charcoal stack, 33 by 10½; annual capacity, 2,000 tons.—Last active in February, 1904; for sale.

Oswego Furnace, Oswego, Oregon. One charcoal stack, 60 by 13; annual capacity, 15,000 tons.—Last active in 1894.

Total number of furnaces, 39; total annual capacity, 1,197,600 tons. Of the total 16 stacks, with an annual capacity of 629,000 tons, used coke for fuel when last in blast; 11 stacks, with an annual capacity of 448,500 tons, used anthracite and coke; and 12 stacks, with an annual capacity of 120,100 tons used charcoal.

MONUMENTAL ENGINEERING BUILDING

PRESENTED TO THE THREE SOCIETIES AND CLUB BY ANDREW CARNEGIE.

Report of the Committee Describing the Magnificent Structure—Large Auditorium, Ample Library Plans, Lecture Rooms, and Other Features.

The following is the report made to the governing bodies of the three great engineering societies by the joint committee consisting of Chas. F. Scott, Bion J. Arnold and S. S. Wheeler of the American Institute of Electrical Engineers; C. W. Hunt, James M. Dodge and F. R. Hutton of the American Society Mechanical Engineers; and A. R. Ledoux, Chas. Kirchhoff and Theodore Dwight of the American Institute Mining Engineers:

The public competition instituted by the Joint Committee for the selection of architects for the planning and erection of the buildings presented by Mr. Andrew Carnegie for the American Institute of Electrical Engineers, American Society of Mechanical Engineers, American Institute of Mining Engineers, and the Engineer's Club, resulted in the presentation of twenty-six sets of plans for the building. After a careful examination of these plans, the committee appointed Messrs. Hale and Rogers, and Henry G. Morse, associate, architects, for the three engineering societies, and Whitfield & King, architects, for the Engineers' club.

ENGINEERING BUILDING LOOKING NORTHWEST.

The architects' plans embody a general scheme which is acceptable to the committee which represents the societies. The committee reports these plans herewith to the councils of the three societies named in the letter of gift, and believes that it would be of interest and service if the report should be sent to the members of all the societies.

It will be recalled that the frontage of the engineering building on Thirty-ninth street, between Fifth and Sixth avenues, covers five city lots, or 125 feet front, and 100 feet deep. The building law of the city of New York requires that a building shall occupy only 85 percent of the lot area. Advantage is taken of this requirement to have space on all sides of the building, thus giving the building a monumental appearance. The building utilizes 115 feet of the 125 feet front, and 90 feet of the 100 feet depth, the lot numbers being 25 to 33.

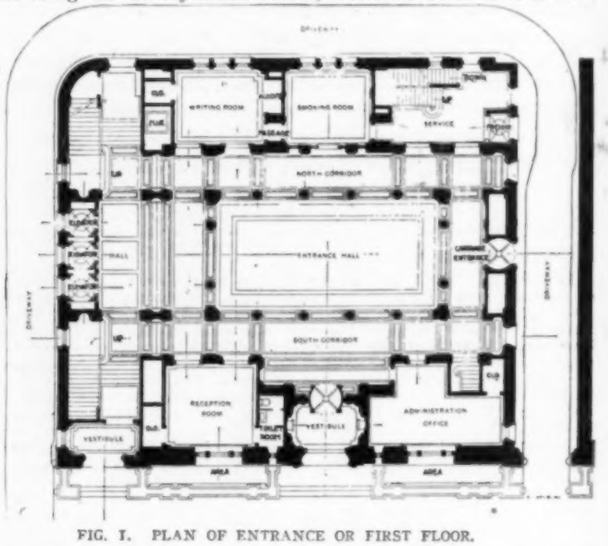


FIG. 1. PLAN OF ENTRANCE OR FIRST FLOOR.

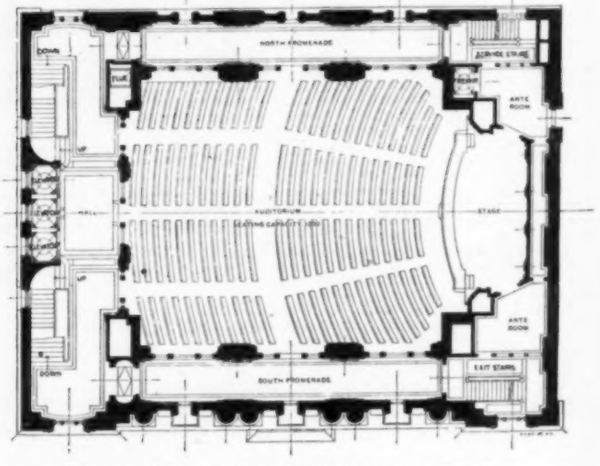


FIG. 2. PLAN OF AUDITORIUM OR THIRD FLOOR.

The engineering building must meet requirements in five directions:

1. It must serve the convenience of each of the individual societies, which enter the building as founders. This has been secured by the proposed arrangement which

is represented on the society office floor plan. The working offices of the representatives of the society, the reception room, board and committee rooms, important elements of the life of the society, are on the desirable south front and are favored by the windows which look to the eastward.

2. The building must supply to the three national founder societies and also to such other organizations as may be invited to participate in its benefits as associates, such meeting rooms and auditoriums as will be required for the annual meetings, the public reading and

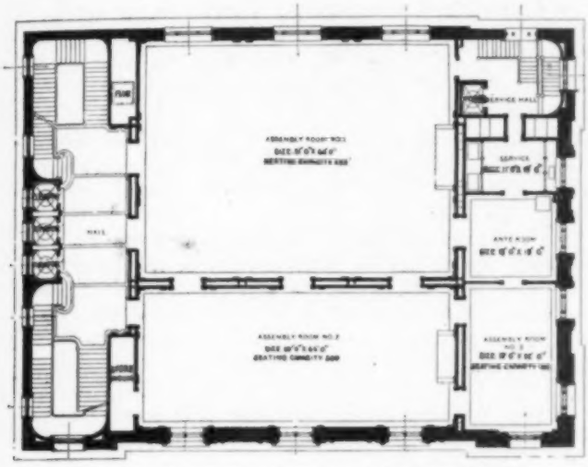


FIG. 3. PLAN OF ASSEMBLY OR FIFTH FLOOR.

discussion of papers, and for scientific lectures and demonstrations. In view of the number of participant societies for which provision has been made, the committee has thought it advisable to arrange for a number of assembly rooms suitable for various uses.

One of these, primarily designed for the national societies' meetings and for those of other large bodies, has been made to accommodate 1,000 persons (Fig. 2). This limit is set as being as large a number as can be expected to hear clearly the voice of a speaker. The location of this large auditorium is on the first floor above the street so as to make elevator service for it unnecessary. Attention is directed to the large foyer and generous corridors, which give ample space for withdrawal from the large assembly hall. The ample provision for exit also at the four corners of this floor is to be specially noticed as a desirable provision for safety. To enable auditors in the back of the auditorium to see clearly such diagrams and illustrations as may be on the stage, the seats are arranged on a grade conforming to best modern practice in theaters. This parterre arrangement enables coat-rooms to be provided, opening from the outer corridors, and special consideration has been given to secure rapid service with large numbers in attendance. It will be noticed, further, that the large auditorium floor is reached from the great central rotunda on the street floor (Fig. 1) by generous stairways, and that it can also be reached from carriages entering the driveway and moving continuously as they receive or discharge their passengers. The room for preparing apparatus and exhibits for the stage is conveniently served by a large freight elevator, so that heavy machinery and apparatus can be easily handled.

On the floor above the large auditorium are two assembly rooms (Fig. 3) occupying the principal portion of the area. These assembly rooms may be used independently for lecture purposes, or one may be made auxiliary to the other and used as a foyer or conversation room. As to the two rooms adjoining they may be used in common when desired, as, for instance, for purposes of general reception or conversazione. Auxiliary smaller rooms on this floor are provided, and provision is made for the service necessary for light refreshments or luncheon.

On the floor above a number of small lecture halls are provided suitable for ordinary meetings of scientific and engineering societies, and for meeting of sections at the time of general conventions of national organizations. It is expected that there will be a great demand, especially for the small meeting rooms, for scientific purposes. They will be supplied with electric current, with compressed air and with gas and water. The meeting rooms of all sizes will be fitted for the use of the projection lantern, and will be unique in their completeness for the purposes for which they are intended. The board rooms of the society floors will be large enough for the holding of small professional meetings when occasion may require.

3. A crowning detail, in the planning of the building has been the provision on the two upper floors for the libraries of the various societies (Fig. 4). It is the purpose of the societies so to administer the library of each that by bringing them together there shall be created a working and reference library of the highest possible value and completeness as respects engineering science and practice, which shall be unequalled anywhere. The societies have recognized that there is before them an unexampled opportunity, and it is their desire to avail themselves of it fully. In seeking this end the entire top floor is to be devoted to reading and reference rooms, to working alcoves, to rooms for photographic reproduction, and for drawing and similar library work. The roof will be specially constructed to secure the best illumination. The location of the reading rooms at the top of the building will be quiet, cool, airy, and free from dust. The floor below the library reading rooms will be devoted to the book stacks, although when first the societies enter the building, the alcove construction in the reading and reference rooms will take care of the nucleus of the future library which the societies will

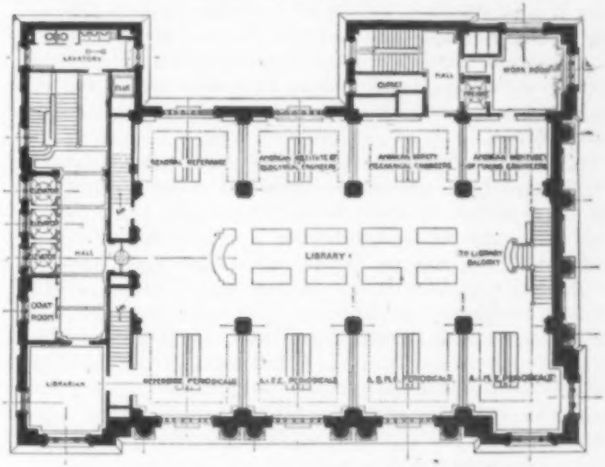


FIG. 4. PLAN OF LIBRARY OR THIRTEENTH FLOOR.

bring with them. This will leave the book stack floor for growth, as the library shall increase in size hereafter. It is believed that by the co-operation of the New York Public Library on the adjoining block, and with the interest and strength which the societies will furnish, the library in the engineering building can be made the most important engineering library of the country. The committee has tried to provide ample space to accomplish this end.

4. The building is also to furnish office accommodation

for a large and continually increasing number of societies which have engineering or some other department of science as their principal object; such are, for example, The New York Electrical Society, The Society of Naval Architects and Marine Engineers, The Heating and Ventilating Engineers, The American Gas Light Association, The National Electric Light Association, The Society of Chemical Engineers, The Association of Edison Illuminating Companies, and many others. For these organizations the building will offer office areas of varying sizes, whose arrangement will be adjusted to the requirements of such participants as shall hereafter be made known. Such participants will have use of the auditoriums of the desired size.

5. The building must also serve as a business office for the founder and the associate societies. Attention is called to the driveway (Fig. 1), whereby access is had on the street level and under cover to the freight elevator, both for boxes of books and for other merchandise moving inward and for mail-sacks moving outward. This driveway also serves for carriage access to the auditorium and passenger elevators. It gives facility for unloading by gravity to the coal pockets of the heating plant without handling. The general convenience of the building is also served by the receiving and shipping office at the rear, through which all goods in and out will be handled. There is also the bureau of information, at the right of the main entrance, where general questions can be answered, visitors directed, and some routine business transacted. This office will also be a suitable location for the telephone exchange, the telegraph and the sub-post-office.

By a business arrangement formed under legal advice and forming part of the deed to the property to the east of the building, a restriction has been placed which prevents the erection on that lot of a building more than sixty feet high. This restriction runs with the land and secures light and air for the building on its eastern front above the third floor. The westerly wall is built ten feet within the property line, so that openings for light and air should always be left on that side and on the rear, even if high buildings should be hereafter built on adjoining property to the west and the north. The committee contemplates finishing the building on all four sides and not merely on the south facade, in order that its monumental character may be seen and recognized from every point of view.

It may be serviceable to remind members of details which have been presented at various times concerning the organization of the holding corporation which is to administer the building for the founder and associate societies. This corporation was formed by special charter in the State of New York, in May, 1904, and is called "United Engineering Society." Its nine trustees are chosen, three each, by the councils of the Electrical, Mechanical and Mining Engineers, and control the building and are responsible for its financial administration. Its charter and by-laws have been the occasion of much careful thought by the societies and by legal counsel, and the title to the land rests in this body corporate. The land passed to these trustees in January, and they are paying the interest and other expenses during construction. It is the unusual character of the trust and its functions which are largely responsible for the delay in beginning construction.

The contract for construction was signed in July, the excavation for the foundations was started at once, and the work of construction has now commenced. The contract limit is fifteen months to date of expected completion.

STRIKERS RESORT TO VIOLENCE.

Post and McCord Find Derrick Ropes Cut.—Declare Strike is Misdirected.

The strike of the Iron Workers' Union in New York against Post & McCord, contractors, who are erecting a number of steel buildings, has reached the acute stage. The strikers are adopting violent means to delay the work carried on with non-union labor. The latest outrage is the cutting of the cables of a derrick employed on the Altman Building at Thirty-fifth Street and Fifth Avenue. The ropes were cut in such a manner that the derrick would have fallen and injured the workmen had they undertaken to use it. Fortunately the condition was discovered before great damage had been done. Attacks upon new men employed upon the building under contract are also reported.

Wm. H. McCord, head of Post & McCord, has issued a statement explaining the position of the firm and showing the absurdity of the attitude of the leaders of the strikers. He said:

"This company has offered repeatedly to produce absolute proof that it has no connection with the American Bridge Co. Still Mr. Ryan, the president of the international body, refuses to accept or even to consider the offer, and continue to strike. A more deplorable and surprising feature of the case is that this strike, which is directed against the American Bridge Co., is not affecting or injuring that company in the least, but falls entirely upon our concern and our customers, whose important contracts are being delayed.

"Nor is the strike directed against the material purchased from the bridge company. If it were, many other large contracts would be held up. But it is directed only on our contracts, and all because of an underground assumption on the part of Mr. Ryan that we are a constituent company of a corporation with which his union had a dispute in Pennsylvania."

More Steel Freighters Ordered.—The American Shipbuilding Co. within the past few days has booked contracts for four steel freighters which will be among the largest and best equipped afloat. Two of the boats will be for the Cambria Steel Co. and were ordered for that interest by M. A. Hanna & Co. of Cleveland. The Pittsburg Steamship Co. has contracted for two additional steamers to duplicate the two 600-footers ordered some weeks ago. The American Shipbuilding Co. now has contracts on hand for twenty-nine steamers ranging, with two exceptions, from 6,500 to 12,000 tons carrying capacity. The Great Lakes Engineering Co. has orders for a car ferry and six 10,000 tons bulk freight steamers, and the Toledo Shipbuilding Co. will build a passenger steamer and two large freighters.

State's Attorney John J. Healy has filed application with the Superior court of Illinois for an injunction to restrain the Illinois Steel Co. from filling in or reclaiming the submerged lands adjacent to its plant in South Chicago which fronts on Lake Michigan. The courts are asked to settle the title to the "made" land which the steel company has filled up above the level of the lake by dumping in slag and other refuse, and which is claimed by the state.

The Weller Rolling Mill & Forge Co., whose plant at Anniston, Ala., was recently partially destroyed by fire, is negotiating with the Commercial Club and other business interests of Gadsden, Ala., for its removal to that town. It reports, however, that as yet no definite arrangements have been made.

NEWS FROM MANY INDUSTRIES.

New Buyers:—

The Fidelity Construction Co., Fort Worth, Texas, has been incorporated with a capital stock of $10,000 to build railroads and bridges. The incorporators are: Joseph G. Wilkinson, Ben. W. Fouts and Joseph E. Willis.

The Virginia Pipe & Foundry Co., Richmond, Va., has been incorporated with $50,000 capital stock to establish a plant for the manufacture of iron piping and plumbers' supplies. The officers are: Thos. Wheelwright, president; Christopher Manning Jr., vice president, and Harry Wayt, secretary and treasurer.

McClintock & Co., Hartford, Ind., have filed new articles of incorporation with a capitalization of $30,000. The company was formerly engaged in the manufacture and sale of machinery, tools, oil engines, etc., but will now build a new plant and manufacture the Morrison crude oil engine on a large scale. The officers are: George R. Bell, president; Charles A. McClintock, secretary, and John A. Sweet, treasurer.

The Old Dominion Bridge & Construction Co., Lynchburg, Va., recently organized with a capital stock of $300,000, has elected the following officers: President, Walker Pettyjohn; vice president, William Hurt; secretary, A. R. Long, and treasurer, W. L. Moorman. The directors are: H. E. McWane, J. G. Payne, N. B. Handy, George D. Witt, M. H. Dingee, Walker Pettyjohn and William Hurt. In all probability the work of erecting a plant will be begun in the near future, as a site has been secured.

The Butler Car Wheel Co., Butler, Pa., is soon to apply for a charter, through T. H. Gillespie, William Bierman and John M. Hansen, of the Standard Steel Car Co. It is stated that a plant will be erected in Butler, where the company owns considerable land. The new company will manufacture iron and steel castings, car wheels and forgings and articles of iron and steel used in the manufacture of rolling stock, machinery, etc.

The Transvaal Iron & Steel Co., has been organized with a capital of $250,000 according to United States Consul Snodgrass, of Pretoria, Transvaal. The new company will manufacture bar iron of almost every description. A plant will be constructed halfway between Pretoria and Johannesburg, at Zuurfontein, on the South African railroad. It is stated that a prominent Pittsburg iron and steel manufacturer is promoting the scheme, and that a large ore bed has been purchased and plans definitely completed for the erection of the plant along American lines.

The Gould Balance Valve Co., Des Moines, Iowa, has been incorporated with a capital stock of $45,000, by W. F. Gould, W. H. Lane, J. A. Gunn and M. H. Meigs, all of Des Moines.

The David Bell Engineering Works, Buffalo, N. Y., has been incorporated to manufacture boats, barges, castings, engines, boilers, etc., with a capital of $30,000. The incorporators are: David Bell, George H. Bell, Harris T. Dunbar, Henry D. Mills and Frederick C. Slee, all of Buffalo.

C. A. Mezger, Inc., Manhattan, N. Y., has been organized to manufacture motors, engines, machinery, etc., with a capital of $5,000. The incorporators are: Minnie Mezger, Raymon M. Owen, and Zoe Owen, New York.

The Syracuse Twist Drill Co., Syracuse, N. Y., has been incorporated to manufacture twist drills, tools, machinery, etc., with a capital stock of $20,000. The incorporators are: Thomas Hooker, John Balz, Charles W. Chadwick, Frank Singer and Charles A. Kendall, all of Syracuse.

The Fuller Machine & Supply Co., Manhattan, N. Y., has been incorporated to manufacture machinery, etc., with a capitalization of $10,000. The incorporators are: Arthur R. Fuller, Brooklyn; James N. Fuller, Robert Robinson, Passaic, N. J.; and James L. Whritner, Suffern, N. Y.

The Potter Mfg. Co., New Brunswick, N. J., has been incorporated to establish a machine and tool shop and plant. The incorporators are: Howard Sillcocks, Theo. Whitlock, Frederick J. Potter, all of new Brunswick. The capital stock is $50,000.

The Baker Gear Co., Homer, N. Y., has been incorporated with a capitalization of $70,000 to manufacture machinery, tools, etc. The incorporators are: Frank Baker, James R. Morrison, Syracuse; Robert L. Hastings, Edwin H. Hastings, Homer.

The Union Boiler Co., Pennington, N. J., has been organized to manufacture boilers, engines, etc., and to conduct a general building, contracting, and decorating business. The incorporators are: Charles O. Lyon, Short Hills, Edward Benedict, all of Summit; and Lewis M. Thatcher, West Nutley.

The Miller Foundry & Specialty Co., North Tonawanda, N. Y., has been incorporated with $30,000 capital stock to carry on a foundry, plumbing and heating business. The incorporators are: Alice M. Miller, George O. Miller, and Amos Miller, all of North Tonawanda.

The Palace Motor Car Co., Buffalo, N. Y., has been incorporated to manufacture motors, engines, cars, boats, etc., with a capital stock of $15,000. The incorporators are: Charles F. Benzing, Nathan Dougherty and Charles E. Shaw, Buffalo.

The Bennett-Zamboni Mfg. Co., Manhattan, N. Y., has been incorporated to manufacture dies, tools, machinery, etc., with a capital of $10,000. The incorporators are: George W. Bennett, Kenosha, Kis.; Lawrence Zamboni and Frank D. Homan, New York City.

J. Ginther's Sons Co., Buffalo, N. Y., has been incorporated with a capitalization of $100,000 to manufacture machinery, steel and iron beams, etc. The incorporators are: Louis Ginther, Jacob D. Ginther, Frank J. Ginther, Peter M. Ginther and Henry G. Ginther, all of Buffalo.

The Baldwin & Robbins Company, Newton, Mass., has been incorporated with a capital stock of $150,000 to deal in iron, steel, etc. The officers of the company are: President, A. H. Decatur, Newton; treasurer and clerk, W. A. Hopkins, Boston.

The Dupuis Mfg. Co., Fall River, Mass., has been incorporated to deal in machinery, apparatus, etc. The company is capitalized at $100,000 and is controlled by C. Dupuis, president, Fall River; and E. Fournier, treasurer, also of Fall River.

Rudolph Gerling & Co., Chicago, have been incorporated with a capital of $5,000 to manufacture metal goods. The incorporators are: Frank Emerich, James D. Greenebaum and Herman Levy.

The Troy Foundry Co., Troy, O., has been incorporated by J. M. Combs, J. W. Morris, J. J. Hoban, John Headley, William Harp and W. M. Harp with a capital stock of $10,000.

The Sandstrom Short-Turn Gear Co., Indianapolis, Ind.,

has been incorporated with $100,000 capital stock. The company will construct vehicles with a short-turn gear, made possible by a fifth wheel on the back axle connected with the front fifth wheel so that they work together automatically, keeping the front and back wheels in line. The directors are: Clemens Vonnegut Jr., Theodore Sandstrom, Alfred F. Potts, Chas. J. Schuh and William H. Sherry.

The North Texas Culvert, Sewer & Construction Co., Dallas, Texas, has been incorporated with $30,000 capital stock by D. E. Waggoner, I. J. Willingham, William Halsell, Rhodes Baker, J. C. Thomas, C. J. Marks, all of Dallas; S. E. Voris, S. D. Helm and F. L. Schneider, both of Crawfordsville, Ind. The company will manufacture steel culverts, sewer pipe and curbing, a site having already been secured for the erection of a corrugated iron building 40 x 120 ft.

The Southern Iron & Equipment Co., Atlanta, Ga., has been incorporated with a capital stock of $300,000, with privilege to increase it to $1,000,000, to continue the working of a plant for rebuilding locomotives. The incorporators are: F. P. Kern, W. A. Love and A. J. Merrill. It is probable that improvements will be made in the near future.

The Colonna Dry Docks Co., Norfolk, Va., has been incorporated to take over and enlarge the ship repair yards of C. J. Colonna. The officers are: President, J. L. Crandall, Boston, Mass.; vice president, C. J. Colonna, Berkley, Va.; second vice president, H. A. Pressy, Washington, D. C.; and J. C. Howell, also of Washington, furnaces will be built and a railroad to Santiago.

The El Mamey Iron Co., Duluth, Minn., has been incorporated with a capital stock of $250,000 to develop iron ore deposits in the state of Colima, Mexico. Iron furnaces will be built and a railroad to Santiago.

The following companies have been incorporated under the laws of Ontario: Banwell Hoxie Wire Fence Co., Ltd., Hamilton, $100,000. Provisional directors: Henry Banwell, Elizabeth Brett, Agnes W. McGregor, Alex B. Bartlet and James E. Banwell.—Clinton Threshing Co., Ltd., Clinton, $50,000. Provisional directors: David A. Forrester, Wm. W. Farran, Wm. Jackson, Wm. Gunn and Charles E. Hovey.—Calder Grain Shocker Co., Ltd., Hamilton, $30,000. Provisional directors: James Calder, Geo. S. Bingham, John J. Morton, Henry Rader, and Alex R. Wardell.—Adjustable Axle Nut Co., Ltd., London, $31,000. Provisional directors: Richard C. Williams, John Sussex, Andrew R. Simpson, Wm. T. Pridham and Wm. E. Davis.

The Pneumelectric Machine Co., Syracuse, N. Y., incorporated with a capital stock of $500,000, will manufacture fluid pressure tools, drills, etc. The incorporators are: Alexander Palmros, John E. Woodruff, Robert K. Dykes, Arthur J. Briggs, Dean Clark, Lucien C. Wilson, and Thaddeus Kidd, all of Syracuse, N. Y.

The Fair Haven Iron Ore Co., Albany, N. Y., has been granted articles of incorporation to mine, produce and sell iron ore. The capital stock is $100,000 and the incorporators are: Barnet H. Davis, Palmyra, N. Y.; Freeman Pintler, Ontario, N. Y.; James S. Whipple, Salamanca, N. Y.; James B. Lyon, Albany, N. Y., and H. B. Selleck, Ontario, N. Y.

The Boiler Specialty & Manufacturing Co., Rochester, N. Y., will manufacture machinery, tools, etc. The capital stock is $15,000 and the incorporators are: Orrin Haxie, Charles J. Robinson, and Joseph J. Miller, all of Rochester, N. Y.

The Omega Steel & Tool Co., Ansonia, Conn., has been organized by W. H. Conklin who recently purchased from the Omega Steel Co. its secret process for the manufacture of steel.

New Construction:—

The Post Pipe Co. has been organized with a capital of $125,000 at Texarkana, Texas, for the purpose of building and operating a sewer pipe manufacturing plant at that city. The new company is a branch of the Blackmer & Post Pipe Co., St. Louis, and will be controlled by L. W. Post, president; L. R. Blackmer, vice president; J. T. Wallace, second vice president; G. R. Payne, secretary and treasurer, and M. P. Post, superintendent. A three story brick factory building 80 x 252 ft. with a 40 x 100 ft. annex for heavy machinery and eight 32-ft. down draft modern kilns will be constructed in the near future. The company is located with unusual railroad facilities.

The Norfolk & Western Railway Co., Norfolk, Va., is contemplating the erection of a double track hoisting iron bridge over the eastern and southern branches of the Elizabeth river, to cost about $400,000. C. H. Churchill, Roanoke, Va., is chief engineer.

The Baltimore & Ohio Railroad Co. will build a pier at its terminals at Locust Point, which will be 160 x 975 ft., with concrete foundation on piling, of steel construction with corrugated iron sides, slag roof, metal frames and sashes. The cost will be in the neighborhood of $500,000. D. D. Carothers, Mt. Royal Station, Baltimore, Md., is chief engineer, and the contract has been let to the McLean Contracting Co., Baltimore.

The United States Horse Shoe Co., Erie, Pa., finds it necessary to enlarge its plant because of its increased business. An addition to the mill building 40 x 70 ft. and one 40 x 60 ft. to its warehouse, both of steel construction will be completed by Jan. 1. The contract has been let to the McClintic-Marshall Construction Co. of Pittsburg.

The Monarch Coupler Co., Detroit, has let the contract for the erection of a new steel casting plant adjoining its property at Delray. The plant when completed will occupy four acres. The steel work will be furnished by the Russel Wheel & Fdy. Co., Detroit; the ovens by Wm. Smythe & Sons of Pittsburg; and the cranes and similar machinery by the American Engineering Co., Detroit.

The new plant of the Armstrong Bros. Tool Co., Chicago, consists of a main building 175 x 60 feet, three stories in height exclusive of a basement, of standard mill construction with stairways and elevators enclosed in brick shafts fitted with fire proof automatic closing doors. There is a one story annex, 175 x 30 feet. Careful attention has been paid to the securing of perfect light and ventilation. Much new machinery of late type has been installed, steel pulleys with pressed steel hangers and roller bearings being used exclusively. Iron and steel are used wherever possible in partitions, benches, stands, drawers, packing tables, racks and shelving. The assembling, stock and shipping rooms are especially remarkable in this respect.

It is expected that the work of remodeling the plant of the Morgan Spring Co., Struthers, O., formerly the Youngstown Mfg. Co., will be complete by Feb. 1, when it will begin operating on steel rod and wire fencing, nuts and bolts. F. F. Bullard is general manager of the plant.

The Lackawanna Steel Co. is making active preparations towards starting its Buffalo by-product coke oven plant. The Lebanon plant, which has been successfully operated for the last three months, has been altered so that the ovens will permit the charging of loose coal from the top; originally, they were charged at the end with coal in the form of compressed cakes. The changes were made by Jepson, Mason & Co., Buffalo, who are now filling a like contract on the 300 ovens of the Buffalo plant.

The ten buildings which will form the home of the Halcomb Steel Co., Syracuse, N. Y., are nearing completion at a cost of $100,000 and it is expected to begin

operations Jan. 1, employing 1,000 men. The company has decided to branch out into a wider field than originally planned and for that reason the stockholders have increased the capital from $460,000 to $900,000.

The Michigan Stamping Co., Detroit, has entered its new building at 759 Bellevue Ave. The plant is 100 x 200 feet, has good transportation facilities and contains much new machinery.

The Belle City Malleable Iron Co., Racine, Wis., is putting up two buildings, the first 200 x 100 feet, containing two new furnaces, and the other, 80 x 100 feet containing four new annealing furnaces. These additions will increase the plant's capacity from 7,000 to 10,000 tons yearly, chiefly in railroad equipment and agricultural machinery.

The Russel Wheel & Foundry Co., Detroit, has under way additions to its plant which will increase its capacity 100 percent. A foundry building, 150 x 386 feet is being erected and a factory for construction work will be 90 x 140 feet.

The United States Radiator Co., West Newton, Pa., is building an additional warehouse, 50 x 200 ft., two stories. A two story extension 50 x 180 ft. will be made to the foundry in a short time.

A two-story building 65 ft. long by 40 ft. wide has just been completed by the De Witt Wire Cloth Co., Newark, N. J., and will be put in operation as soon as the necessary machinery is in place.

The Red River Furnace Co., Clarksville, Tenn., will erect in the near future a machine shop and foundry of mill construction equipped with modern machinery. All supplies have been purchased.

A steel drawbridge across the Ocmulgee river at Abbeville, Ga., will be constructed by the people of that town. Communications should be addressed to the town clerk.

Carson & Fulwood, Tifton, Ga., are preparing plans for the establishment of a foundry and machine shop.

The Ozark Blast Furnace Co., Kansas City, Mo., intends erecting a coke furnace with an estimated monthly capacity of 6,000 tons.

Fires:—

The boiler house and engine room of the Double Truss Cornice Co., Buffalo, was destroyed by fire Dec. 1, valuable machinery being badly damaged.

The Walsh Brake Shoe & Foundry Co., Rock Island, Ill., which recently sustained heavy loss by fire, is undecided as to where it will rebuild and on what scale.

The Graff Stove & Range Co., Pittsburg, sustained a practically complete loss of its plant by fire Dec. 1.

The machine shop of the Republic Iron & Steel Co., Moline, Ill., was visited by fire Nov. 27, with a loss estimated at $20,000.

The car and blacksmith shops of the Prince Edward's Island Railroad, Charlottetown, P. E. I., were visited by fire Nov. 29, incurring a loss of about $60,000.

The Double Truss Cornice Brake Co., Buffalo, N. Y., suffered a loss of about $5,000, Dec. 1, when its boiler house and engine room were destroyed by fire.

The Trimount Wrench Co., Roxbury, Mass., was destroyed by fire on Dec. 6. The loss is estimated to be about $40,000.

The Westmoreland Specialty Brass Co., Grapesville, Pa., sustained a loss of about $25,000 on Dec. 3, due to fire in the foundry department of the plant.

Fire of unknown origin caused a loss of about $10,000 to the plant of the Carbon Steel Co., Pittsburg, Dec. 7. The blaze originated in the oil shed and spread to the machine shop adjoining, but was checked there before heavy damage had resulted. The fire caused the company little inconvenience and orders are being filled as usual.

The Pittsburg Gauge & Supply Co., sustained a $35,000 loss by fire Dec. 6, the heaviest damage being in the pattern department on the third floor of the plant.

The Peoria Coal Drill & Hardware Co., Peoria, Ill., was damaged to the extent of $10,000 by fire Dec. 1. The loss was chiefly in the store, the drill works being little damaged.

General Industrial Notes:—

Headford Bros. & Hitchings, Westfield, Ia., have found a recent addition to their foundry inadequate to the needs of their growing business, and have purchased a building erected for the Waterloo Self-Feeder & Pump Co.

The charcoal furnace of the Round Mountain, Ala., Iron & Wood Alcohol Co., is ready for the torch after a considerable idleness for overhauling.

The new billet and bloom mill of the Lackawanna Steel Co., Buffalo, N. Y., is in full operation. Its output of 40,000 tons of billets a month will be used in its structural mills.

M. J. Drummond & Co., of New York, who recently secured the cast iron pipe works at Reading, Pa., have begun operations under the name of the Drummond Pipe Works. They have also leased a portion of the old Mellert Works. W. C. Foster is general manager of the plant and A. H. Mellert is superintendent.

The L. L. L. Elevator Controller Co., recently incorporated with offices in the St. Paul Building, Brooklyn, will manufacture a patented safety device for controlling elevators. The officers are: A. W. Southard, president; Chas. F. Lewis, vice president; Benj. W. Lewis, secretary and treasurer; and L. J. Doolittle, counsel.

The German Steel corporation announces that it has sold its output for the first quarter of 1906. An advance in prices on structurals is promised.

Mexican railroads, it is estimated, will spend $10,000,000 in repairs, improvements and the building of new lines and the completion of those now in course of construction.

The wire production of the United States Steel Corporation for 1905 is estimated at 1,400,000 tons, the largest in its history.

Negotiations are pending whereby the plant of the Grand Rapids Malleable Works, Grand Rapids, Mich., may pass into the control of Chicago interests. Edward Lowe is president of the company and D. M. Ray is secretary.

Two recent decisions of the United States Board of appraisers concern the importers of scrap steel into this country. Steel rails which have been used and broken up are not to be assessed as steel rails, and hoop and band steel which has been exported from this country and reimported as scrap are to be entered free of duty as articles of manufacture of the United States.

New records were made during the month of November at the Baldwin Locomotive Works when 228 complete locomotives were turned out. Orders have been booked for 15 freight and five passenger engines from the Lehigh Valley Railroad, 75 locomotives for the 'Frisco lines and numerous other orders which will keep the company at full capacity for some time.

The Century Coke Co., near Brownsville, Pa., has been bought by C. E. Lenhart and J. H. Hillman & Son of Pittsburg for $507,000. Thirty coke ovens are now in operation and 200 more will be built in the near future. Considerable new construction is contemplated and equipment, especially boilers and machinery will be needed. The property contains 350 acres.

The Omaha Machinery & Construction Co., Omaha, Neb., recently incorporated to deal in new and second hand machinery, has elected the following officers: D. J. Henchy, president; T. H. Fritts, secretary and treasurer,

and Frank Daley, manager. The company is located at Tenth and Douglas streets.

The Winkley Co., Hartford, Conn., will remove its business to Detroit, Mich., during the latter part of the month. The company manufactures oiling devices for machine tools, engines, the Garllus carburettor, Eureka separator and automobile work and will be ready to fill orders in its more commodious plant Jan. 1.

The Hydraulic Machine Co., Pittsburg, intends enlarging its plant preparatory to a change of method in operating. The steel casting business will be separated from the iron and brass foundry departments and organized as an independent company under the name of the Iron City Steel Castings Co.

At the annual meeting of the Connecticut Valley Metal Trades Association held Nov. 27, at Springfield, Mass., the following officers were elected: President, Richard D. Reed, Westfield; vice president, C. P. Fay, Chicopee Falls; secretary, F. C. Breakspear, Chicopee; treasurer, Springfield National Bank; executive committee, F. C. Fieker, Northampton; A. A. Coburn, Willimansett; M. W. Bushnell, Thompsonville, and T. J. Rider, Springfield.

The Challingworth Foundry & Machine Co., recently incorporated for $150,000, expects to locate in Mt. Vernon, O., where it will manufacture air-furnace and semi-steel castings, gray iron castings up to 30 tons and brass castings. C. M. Stamp and H. C. Challingsworth, formerly with the C. & G. Cooper Co., of that city, will have an active interest in the company.

The Curtis & Curtis Co., Bridgeport, Conn., has opened a large store at 60 Center street, New York, where a full line of its pipe-cutting and threading machinery will be carried, with H. H. Walker in charge.

The New England Boiler Co., recently incorporated under the laws of Massachusetts, with a capital stock of $200,000, will erect a plant at Mystic, Conn. The officers of the company are: Frank R. Hazard, president; George M. Faulkner of Boston, secretary, and William H. Page of Mystic, treasurer.

Trade Notes:—

The Cleveland Crane & Car Co., at its plant at Wickliffe, O., is filling an order of the American Cast Iron Pipe Co., Birmingham, Ala., for six heavy pipe foundry cranes and another order for a large gantry crane for the Missouri Pacific Railway yards at St. Louis.

The Maryland Steel Co., Sparrows Point, Md., has secured the contract for building three steel tugboats and one steel self-propeller lighter for the Pennsylvania Railroad Co. The tugboats will be 105 feet over all.

The Northern Engineering Works, Detroit, have been awarded the contract for building the electric cranes needed in the new steel casting foundry of the Monarch Coupler Co., Ltd., of that city. They will be of ten and twenty-five tons capacity, with spans of fifty feet, and each will be equipped with four motors. This concern recently installed three electric traveling cranes in the plant of the Detroit Steel Casting Co.; of these one was a thirty ton, four motor ladle crane of seventy foot span, and two were ten ton, three motor electric cranes of the same span. For the same concern a ten ton, eighty foot electric gantry crane for yard purposes is being constructed.

The Live Stock Pavilion recently erected at the Union Stock Yards, Chicago, has a seating capacity for 7,000 people. It is supported by great arches which measure 200 feet from center to center of bases. Approximately 1,000 tons of steel were required for its construction, the Modern Steel Structural Co., Waukesha, Wis., furnishing the structural steel. The same company has just completed the erection of a steel coal handling bridge for the Robins Conveying Belt Co. of New York. The bridge is supported by a pivotal tower and swings around a stiff leg in a half circle, measures 360 feet between tower and leg: its length, including cantilevers, is 500 feet.

The Pennsylvania Railroad Co. has purchased six 12-in. plain power ramming machines from the E. H. Mumford Co., Philadelphia, for installation in its shops at Altoona.

TRADE PUBLICATIONS.

F. E. Myers & Bro., Ashland, Ohio, are distributing a catalog and price list of power pumps. This catalog contains about 50 pages, wherein an extensive line of the company's products is both illustrated and described, including horizontal and vertical power pumps, working heads, pumping jacks, countershafts, horse power, boiler feeder pumps, irrigation cylinders, etc. The price lists are well distributed throughout the catalog and tables showing amount of water discharged per stroke by a pump are also incorporated.

The C. W. Hunt Co., West New Brighton, Staten Island, N. Y., in its new catalog No. 058 describes and illustrates "Hunt" steam hoisting engines, including the "Hunt" heavy duty engines, single drum hoisting engines, two-drum engine, two-drum universal hoisting engine and steam shovel engine with counterbalance. The catalog also describes and illustrates the various parts of the engine. This catalog also incorporates a number of tables of sizes, and illustrates various special engines manufactured by the company.

Brown & Sharpe Mfg. Co., Providence, R. I., has recently published its 1905 catalog, No. 107, describing and illustrating mechanical machinists' tools. This catalog contains 164 pages and describes and illustrates various kinds and sizes of steel rules, steel straight edges, triangular metallic scales, draftmen's protractors, open steel triangles, steel squares, lathe test indicators, universal bevels, automatic center punches, calipers, dividers, trammels, height gauges, depth gauges, mercury plumb bobs, screw thread tool gauges, rolling mill gauges, etc. A number of new tools manufactured by this company are also described and illustrated, including hook rules, knife edge straight edges, scribers, tool makers' clamps, micrometer calipers, caliper sets, ground flat stock, etc. This company also manufactures milling machines of various types, grinding machines, gear cutting machines, screw machines, and annealing and case hardening furnaces.

Gould & Eberhardt, Newark, N. J., are disseminating information in the form of a catalog describing their "High Duty" shapers and attachments. The catalog contains about 50 pages and is well illustrated, some of the illustrations showing the "double triple quick" stroke 14 inch regular style shaper, "double triple quick" stroke 16 inch extension base shaper, and sinker head shaper for steel casting foundries made in one size only. These different types of shapers are all described in detail in the catalog and a dissertation on the work done by the shaper is also incorporated therein. The last half of the book is given over to illustrations and descriptions of the various attachments that can be furnished with the shapers, Some of these are the perfected vise used for heavier classes of shapers, high jawed vise, largely used by mold makers, portable "pull down" vise jaws, useful for a variety of work, and rack cutting and milling attachments for miling specialties. The catalog also contains suggestions for erecting and setting the shapers, together with diagrams and tables showing the dimensions in inches.

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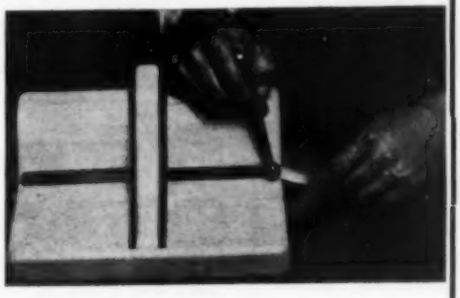

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The Wellman-Seaver-Morgan Co., Cleveland.

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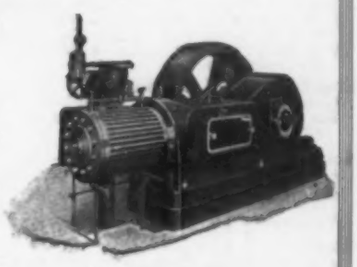

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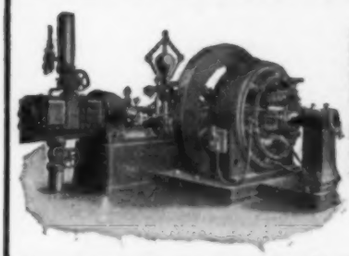

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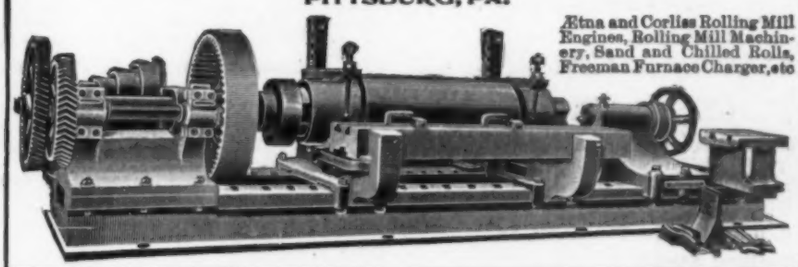

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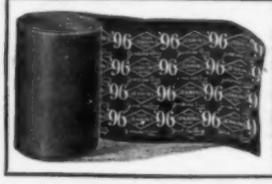

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Jeffery Mfg. Co., Columbus, O.
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Link-Belt Machinery Co., Chicago, Ill.
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Arthur C. Harvey & Co., Boston, Mass.
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Republic Iron & Steel Co., Chicago, Ill.
Russel Wheel & Fdy. Co., Detroit, Mich.
N. & G. Taylor Co., Philadelphia, Pa.
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United Steel Co., Canton, O.

Sheet Bars and Slabs—
La Belle Iron Works, Steubenville, O.
N. & G. Taylor Co., Philadelphia, Pa.
United Steel Co., Canton, O.

Sheet Metal Stampings—
Avery Stamping Co., Cleveland, O.

Shovels, Spades and Scoops—
Avery Stamping Co., Cleveland, O.

Shovel Machinery (Open and Smooth Back)—
Union Foundry & Machine Co., Pittsburg, Pa.

Shop Torches—
Dayton Malleable Iron Co., Dayton, O.

Slotters—
Baker Bros., Toledo, O.
Niles-Bement-Pond Co., New York.

Spike Machines—
National Machinery Co., Tiffin, O.

Springs—
Harrow Spring Co., Kalamazoo, Mich.

Sprue Cutting Machines—
Northern Engineering Works, Detroit, Mich.
The S. Obermayer Co., Cincinnati and Chicago
J. W. Paxson Co., Philadelphia, Pa.
The J. D. Smith Fdy. Supply Co., Cleveland.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

Standpipes and Stacks—
Girard Boiler & Mfg. Co., Girard, O.
The Meehan Boiler & Construction Co., Lowellville, O.

Steam Shovels and Dredges—
Bucyrus Co., South Milwaukee, Wis.
Marion Steam Shovel Co., Marion, O.
Thew Automatic Shovel Co., Lorain, O.
Vulcan Iron Works Co., Toledo, O.

Steel—
American Bridge Company of New York.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburg, Pa.
Crucible Steel Co. of America, Pittsburg, Pa.
Cumberland Steel Co., Cumberland, Md.
Harrow Spring Co., Kalamazoo, Mich.
Arthur C. Harvey & Co., Boston, Mass.
Wm. Jessop & Son, New York City.
Jones & Laughlin Steel Co., Pittsburg, Pa.
La Belle Iron Works, Steubenville, O.
Ernest Law & Co., Philadelphia, Pa.
Lockhart Iron & Steel Co., Pittsburg, Pa.
Otis Steel Co., Cleveland, O.
Republic Iron & Steel Co., Chicago, Ill.
Joseph T. Ryerson & Son, Chicago, New York and Pittsburg.
Scully Steel & Iron Co., Chicago, Ill.
W. H. Thompson & Co., Philadelphia, Pa.
Wm. B. Walter & Co., Chicago, Ill.
L. & R. Wister & Co., Philadelphia, Pa.
West Leechburg Steel Co., Pittsburg, Pa.
United Steel Co., Canton, O.

Straightening Machinery—
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Brodesser Elevator Mfg. Co., Milwaukee, Wis.
Cleveland Punch & Shear Works Co., Cleveland, O.
R. S. Newbold & Son Co., Norristown, Pa.
Niles-Bement-Pond Co., New York.
United Engineering & Fdy. Co., Pittsburg, Pa.
Williams, White & Co., Moline, Ill.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.

Steam Specialties—
James Bonar & Co., Pittsburg, Pa.
A. S. Cameron Steam Pump Works, New York City.
Dravo, Doyle & Co., Pittsburg, Pa.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
Green Fuel Economizer Co., Matteawan, N. Y.
Harrison Safety Boiler Wks., Philadelphia.
Lunkenheimer Co., Cincinnati, O.
Vandyck Churchill Co., New York City.
Jenkins Bros., New York City.
Pittsburg Valve, Foundry & Construction Co., Pittsburg, Pa.
R. D. Wood & Co., Philadelphia, Pa.

Structural Steel—
American Bridge Co., of New York.
Carnegie Steel Co., Pittsburg, Pa.
Reed F. Blair & Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Globe Rolling Mill Co., Cincinnati, O.
Arthur C. Harvey & Co., Boston, Mass.
McClintic-Marshall Cons. Co., Pittsburg, Pa.
Republic Iron & Steel Co., Chicago, Ill.
Russel Wheel & Foundry Co., Detroit, Mich.
Joseph T. Ryerson & Son, Chicago, New York and Pittsburg.
Scully Steel & Iron Co., Chicago, Ill.

Swaging Machines—
S. W. Goodyear, Waterbury, Conn.

Tanks—
W. E. Caldwell Co., Louisville, Ky.
Meehan Boiler & Cons. Co., Lowellville, O.
Niles Boiler Co., Niles, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Russel Wheel & Foundry Co., Detroit, Mich.
Struthers-Wells Co., Warren, Pa.

Taps—
The Cleveland Twist Drill Co., Cleveland, O.
Pratt & Whitney Co., Hartford, Conn.

Tapping Machines (Nut)—
Acme Machinery Co., Cleveland, O.
National Machinery Co., Tiffin, O.
Williams Tool Co., Erie, Pa.

Testing Machines—
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.
United Engineering & Fdy. Co., Pittsburg, Pa.

Thread Cutting Tools—
Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Curtis & Curtis Co., Bridgeport, Conn.
Pratt & Whitney Co., Hartford, Conn.
Standard Engineering Co., Elwood City, Pa.
Stoever Fdy. & Mfg. Co., Myerstown, Pa.
Taylor, Wilson & Co., Limited, Allegheny, Pa.
Williams Tool Co., Erie, Pa.

Thread Rolling Machines—
E. W. Bliss Co., Brooklyn, N. Y.
Farrel Fdy. & Mach. Co., Ansonia, Conn.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

Thermit—
Goldschmidt Thermit Co., New York City.

Tin (Roofing)—
N. & G. Taylor Co., Philadelphia, Pa.

Tin and Terne Plate—
N. & G. Taylor Co., Philadelphia, Pa.

Tin House Machinery—
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
George A. Hogg Iron & Steel Foundry Co., Pittsburg, Pa.
R. S. Newbold & Son Co., Norristown, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
Union Foundry & Machine Co., Pittsburg, Pa.

Tool Holders—
Armstrong Bros. Tool Co., Chicago, Ill.

Tool Racks—
New Britain Machine Co., New Britain, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
Niles-Bement-Pond Co., New York.

Tool Steel—
Armstrong Bros. Tool Co., Chicago, Ill.
Bourne-Fuller Co., Cleveland, O.
Colonial Steel Co., Pittsburg, Pa.
Arthur C. Harvey Co., Boston, Mass.
Wm. Jessop & Son, New York City.

Transmission Equipment (Power)—
T. B. Wood's Sons, Chambersburg, Pa.

Tropenas Process—
Powell & Colne, New York City.

Trucks, Cars and Barrows—
Atlas Car & Mfg. Co., Cleveland, O.
The Cleveland Car Co., West Park, O.
Hill & Griffith Co., Cincinnati, O.
Arthur Koppel Co., New York City.
The Meehan Boiler & Construction Co., Lowellville, O.
Northern Engineering Works, Detroit, Mich.
S. Obermayer Co., Cincinnati, O.
Russel Wheel & Fdy. Co., Detroit, Mich.
The J. D. Smith Fdy. Supply Co., Cleveland.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.
The Wellman-Seaver-Morgan Co., Cleveland, Ohio.

Tubes—
Bourne-Fuller Co., Cleveland, O.
S. Fix's Sons, Cleveland, O.
Globe Rolling Mill Co., Cincinnati, O.
National Tube Co., Pittsburg, Pa.
Joseph T. Ryerson & Son, Chicago, New York and Pittsburg.
Scully Steel & Iron Co., Chicago, Ill.
Shelby Steel Tube Co., Pittsburg, Pa.

Tube Welding—
S. Fix's Sons, Cleveland, O.

Tumblers—
The Adams Co., Dubuque, Ia.
The Globe Mach. & Stamping Co., Cleveland, O.
Hill & Griffith Co., Cincinnati, O.
Northern Engineering Works, Detroit, Mich.
The S. Obermayer Co., Cincinnati and Chicago.
J. W. Paxson Co., Philadelphia, Pa.
The J. D. Smith Fdy. Supply Co., Cleveland.

Tungsten (Metal and Alloys)—
Beaver Metallurgical Co., Beaver Falls, Pa.

Turnbuckles—
Bourne-Fuller Co., Cleveland, O.
Cleveland City Forge & Iron Co., Cleveland, O.
A. G. Hathaway & Co., Cleveland, O.
Republic Iron & Steel Co., Chicago, Ill.

Twist Drills—
The Cleveland Twist Drill Co., Cleveland, O.

Vises—
Hanna Engineering Works, Chicago, Ill.
Merrill Bros., Brooklyn, N. Y.
Wyman & Gordon, Cleveland, O., and Worcester, Mass.

Washer Machines—
National Machinery Co., Tiffin, O.

Washers—
American Iron & Steel Mfg. Co., Lebanon, Pa.
Avery Stamping Co., Cleveland, O.
Milton Mfg. Co., Milton, Pa.
Upson Nut Co., Cleveland, O.

Water Softening Plants—
Harrison Safety Boiler Works, Philadelphia.

Wire (Cable and Rope)—
Lidgerwood Mfg. Co., New York City.
National Wire Corporation, New Haven, Conn.

Wire Nail Machinery—
National Machinery Co., Tiffin, O.